New Almost Free Software

Computing Now!

Canada's Personal Computing Magazine

March 1987

Hard Copy

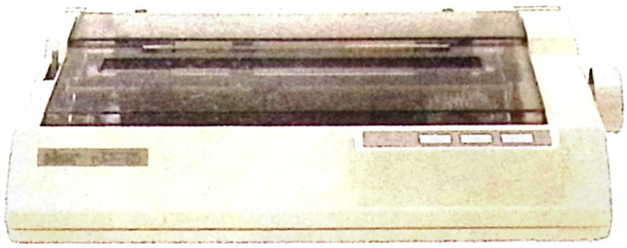
- Laser Printer Survey
- Colour Printers

- C Shanty
- Atari ST Graphics
- Midi Pitchrider
- PC Basic Mutations

MacPoker in C

0 57438 70247 1 03

Exceltronix – Your Authorized Star Micronics dealer



Star's new NP-10. Everything you always wanted in a printer—for less.

Looking for high performance without paying the price? Consider Star's economical NP-10.

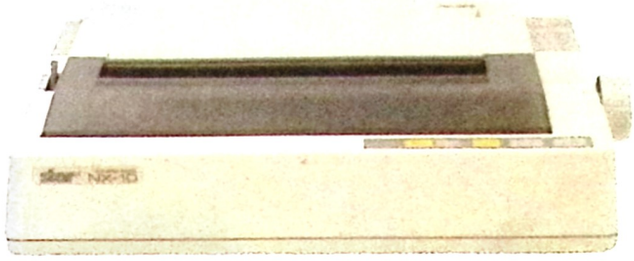
It's ideal for small business or the home because it gives you reliability plus a front panel control for convenience. This plus a high speed draft printing at 100 characters per second and precise 25 cps near letter quality result in outstanding print quality at an affordable price.

The NP-10. It's everything you always wanted in a printer—for less.

star micronics

$339.00

Quantity Discounts available



now superior printing takes just a touch.

Complete control is right up front.

Star's new NX-10™ printer not only gives you crisp draft quality printing at 120 characters-per-second. And clear near-letter-quality printing at 30 cps. But something extra right up front: our easy-to-use front panel.

Here you can select the print mode, print pitch, typeface, margin setting, paper feed—11 functions in all. Both single sheet and tractor feeds are standard.

IBM®-PC compatible and easy to interface, the NX-10 has a 5K buffer—more than twice the memory capacity of any competitor!

The new Star NX-10

Check out this new Star. And put the power of a Star at your fingertips.

In front with quality up front.

star micronics

$429.00

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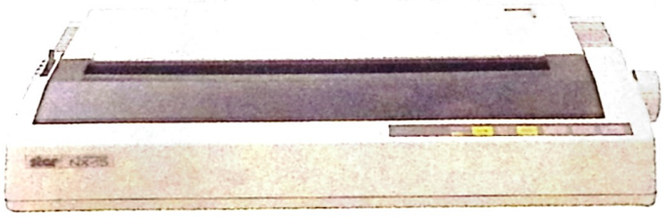

It's easy to look good with the Star NX-15 printer.

Star makes it easy to get great looking originals with the hard-working NX-15 printer.

Our easy-to-use front control panel has all major functions right up front.

Other standards include tractor and single sheet feeds. Italic and bold fact print. And a 15" carriage.

Plus, it's compatible with the IBM®-PC, and most major software.

The NX-15. So it's easy to get better performance from your computer.

star micronics

$659.00

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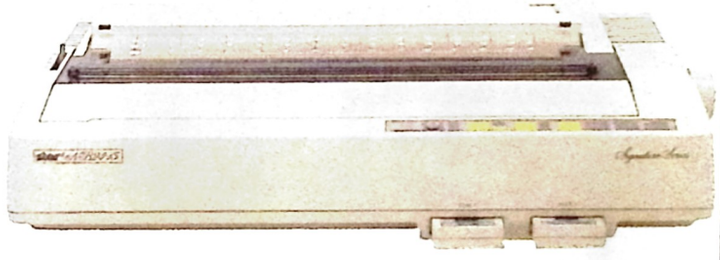

Star's NB24-15. The business printer that works as hard as you do.

Star's 24 wire NB24-15, one of the quality printers in the new Signature Series, offers a convenient front control panel, high speed draft of 180 characters per second; high resolution graphics, true letter quality at 60 cps, comparable to typewritten text, compatibility with major business computers, and your choice of type styles and print pitches.

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star micronics

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Quantity Discounts available

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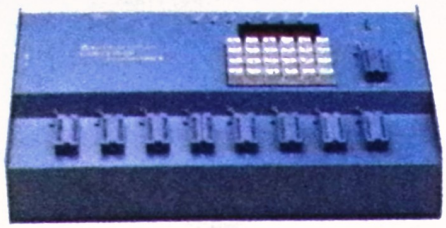
Circle No. 2 on Reader Service Card

Spectacular Gang EPROM Programmer & Emulator



Totally self-contained (has its own display, entry keypad and power supply).

Based on the Z-8 microprocessor.

Can program up to 8 EPROM simultaneously (anywhere from one to 8 EPROMs at the same time with the information in its own memory or master EPROM).

The Gang Programmer can handle a wide selection of EPROMs: 2716, 2732, 2732A, P2732A, 2532, 2764, 27128, 27128A and optionally upgradeable to handle 27256, 27512, 2758 and 2724.

Complete package with EPROM Emulator, 8 ZIF sockets, Gang Programmer with 16Kx8 of RAM and RS232. ..... **$995.00**

Gang EPROM Programmer with 8 ZIF sockets, 16Kx8 RAM and RS232, without Emulator **$695.00**

EMPROM Programmer with only one ZIF socket, 16Kx8 RAM and RS232, without Emulator. Able to do all the functions describe but can handle only one EPROM at a time **$499.00**

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Monitor requirements are dependent upon computer outputs. Please contact Exceltronix for your monitor needs.

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720 x 348 Resolution • 12" Anti Glare Viewing Area

$169.00

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12" diagnoal screen • glare amber display • PC monochrome input (TTL) • 25 lines x 80 characters • 720 x 350 pixels • IBM PC & compatibles.

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13" Anti Glare Viewing Area **$599.00**

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560 x 240 Resolution
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13" Anti Glare Viewing Area **$499.00**

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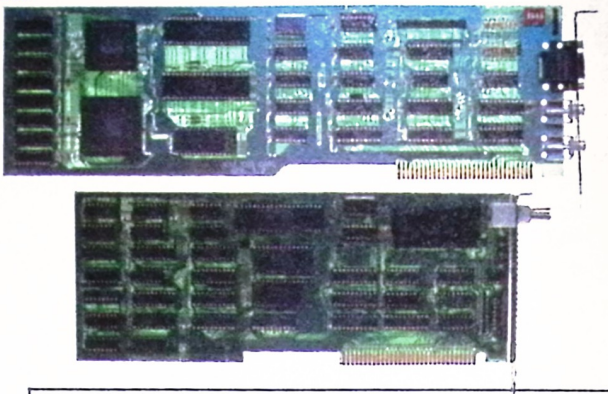
The BEST EGA - Enhanced Graphics Adapter

The BEST EGA card has several modes of video operation available on one card. 100% IBM EGA compatible: 640 x 350 pixels in 16 colours on the enhanced colour display.

It supports functions of the IBM Colour graphics video adapter and IBM monochrome display adaptor, 320 x 200 and 640 x 200 16 colour graphics on the colour graphics monitor, 640 x 350 four shade graphics on the monochrome display (black, normal, intensified and blank), flicker free display, split alphanumeric mode screen display, bit mapped graphics in four planes, up to 512 characters that can be user defined.

The BEST EGA card comes standard with 256K memory for flicker free, text and bit mapped graphics.

$299.00



NIC Network Interface Card

The BEST NIC card allows any PC/XT or AT compatible system to operate in a network environment that supports the ArcNet topology. The BEST NIC uses the Standard Microsystems single chip ArcNet controller and LAN Transceiver chip to conform to all ArcNet protocol requirements.

The NIC Card can be used with many versions of Advanced Novell Netware, as well there is space on the card for user installed firmware, which allows the card to work in a Waterloo Port environment. The User installed firmware can also eliminate the need for floppy drives in the workstations, with the use of a Boot Prom.

The BEST NIC card has 3 LEDs mounted on the rear bracket to indicate network, and token passing activity. Also accessible from the rear of the system are network address selection switches, which allows the network address to be changed without opening the system case.

$299.00

EPROM PROGRAMMER (IBM COMPATIBLE)

MAIN EPROM PROGRAMMER CARD (WITH SOFTWARE)
With 2 standard EPROM sockets ..... **$ 99.00**

EPROM PROGRAMMER WITH ZIF SOCKETS (WITH SOFTWARE)
With one 24-pin. ZIF socket and one 28-pin ZIF socket with provision for serial port **$139.00**

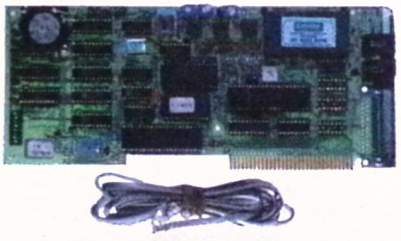
EXTERNAL CARD
Ready to plug into the main EPROM Card (includes one 24-pin and 28-pin ZIF socket and cable). Saves you from opening the computer each time you want to program your EPROMS ..... **$ 69.00**

BEST MODEM

The BEST modem is a smart 1200/300 direct connect modem. It can either be a stand-alone unit in which case it requires a small wall adapter, or it plugs in one of the IBM slots. When used as a stand-alone unit, the modem looks like a Hayes 1200 Smart Modem, that is, it emulates the same instruction set. When it is used in the IBM, it looks like an intelligent serial communications port which also supports a super-set of the Hayes instruction set.

The modem supports auto-dial, auto-answer, and auto-speed select directly from software control. The modem also has a speaker so that aural monitoring of the call is possible. There are also LED monitors so that the state of the modem can always be known. These LEDs are: Modem Ready, Auto-Answer enabled, Carrier Detected, Transmitting, Receiving, Data Set ready.

Software packages such as Crosstalk, PCtalk and Hayes' Smartcom II also will run with this modem.



300/1200 Baud **$249.00**
300/1200 Baud, Stand-Alone Unit, Attractively Packaged **$299.00**

The BEST IBM AT Compatible 4 Meg Memory Card

In order to take advantage of the memory addressing capabilities of the IBM AT or the BEST AVT-286 business computer, we developed a memory card to give the user up to 4 Megabytes of dynamic RAM. The memory card will run at speeds up to 10MHz, which is fast enough to meet the needs of any 80286 microprocessor on the market today. The design uses state-of-the-art (256K x 9) memory arrays, to allow for maximum memory in the smallest physical space. The ninth bit is used as a parity bit to insure the validity of the data. The card is available in memory sizes from 512K to 4 Megabytes in steps of 512K. Boundaries are switch selectable above 1 Meg in blocks of 512K.

With 512K Regular	$ 695.00.	Special	$349.00
With 1 Meg Regular	$ 895.00	Special	$499.00
With 2 Meg		Special	$ 759.00
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Memory and Parts

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41256 (150ns)	$ 3.95
(quantity discounts available)	
2764	$ 5.95
27128	$ 5.99
27256	$ 6.95
6116	$ 3.69
6264	$ 6.20
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5.25" slimline DS/DD Disk Drive with 360K
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• NLQ available in all print sizes • One Year Warranty

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• 180 cps draft quality
• 36 cps NLQ
• 3k Buffer

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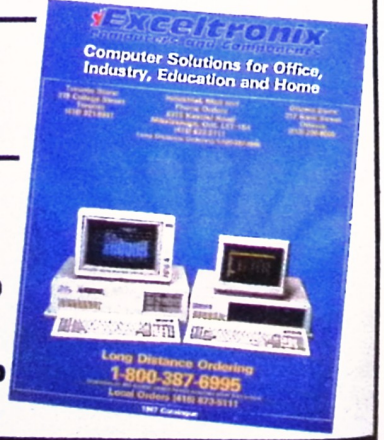
• 15 inch carriage
• 3K Buffer



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Circle No. 3 on Reader Service Card

Computing Now!

Canada's Personal Computing Magazine

Volume 4 No. 12
March 1987

The State of Colour Printers	8
The Pitchriders	14
Survey of Laser Printers	20
Atari ST Graphics	28
The Turing Language Review	34
Inside AutoCAD	38
The MD-4000 Medical Billing Package	42
The GFA BASIC Review	47
Music in C	51
Half a Dozen PC BASIC Mutations	60
MacPoker in C	67

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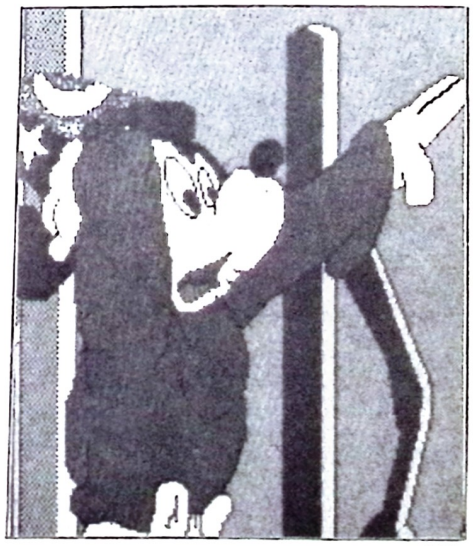
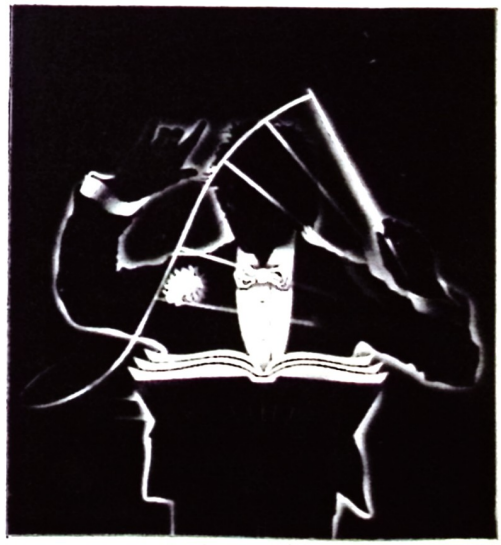


28



51

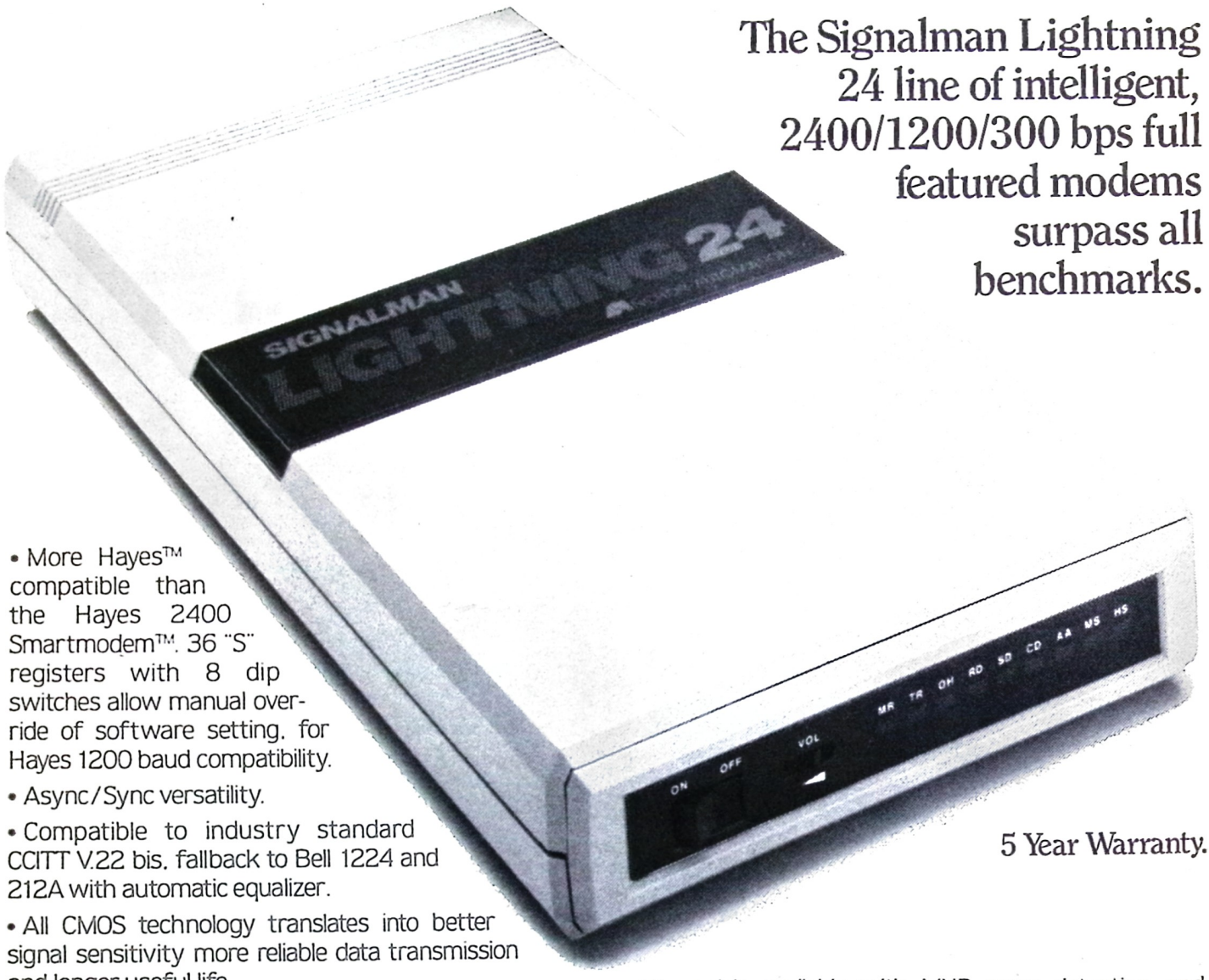
Stray Bits

Computer Press	7	News and New Products	58
Next Month	7	Order Form	66
Almost Free PC Software Volume 22	24	Business Directory	74
Almost Free PC Software Volume 21	41	Advertisers' Index	78

LIGHTNING STRIKES

No Other Modem Stands Up To Comparison.

The Signalman Lightning 24 line of intelligent, 2400/1200/300 bps full featured modems surpass all benchmarks.



- More Hayes™ compatible than the Hayes 2400 Smartmodem™. 36 "S" registers with 8 dip switches allow manual over-ride of software setting. for Hayes 1200 baud compatibility.
- Async/Sync versatility.
- Compatible to industry standard CCITT V.22 bis. fallback to Bell 1224 and 212A with automatic equalizer.
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- 2 built in micro computers allow for dual firmware reconfiguration and saving after powerdown.
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- Battery backed 10 number storage.
- Volume controlled speaker for call in progress monitoring.
- Help menu display. advanced diagnostics self test.

Models include:

- Lightning 24. external model.
- Lightning F/i. internal model with LYNC software.
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5 Year Warranty.

- All models available with MNP error detection and correction capability.

The LIGHTNING 24 modem line is quite likely the most advanced. reliable data communications device available. Signalman is manufactured by Anchor Automation. where quality. innovation and economy are compatible.

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Next Month In

Computing Now!
Canada's Personal Computing Magazine

Desktop Publishing

The April edition of Computing Now! will be the first of six issues to include a focus on desktop publishing. This exciting new area of microcomputer applications offers... or perhaps threatens... to become one of the most productive things one can do with a keyboard and a tube. In our first installment of this feature, we'll be looking at an introduction to the state of the art in desktop publishing hardware and software, plus a look at some of the available applications.

Whether you use a computer in business, the graphics arts or just as a personal tool, desktop publishing has the potential to expand the power of it enormously. You won't want to miss our April edition.

PC Unix

A lot of the people who eventually buy local area networks costing tens of thousands of dollars don't really need them. All they need is some basic multi-user facilities on a basic PC. Unfortunately, MS-DOS is inherently single user, and resists any attempts to change its view of the universe.

While most computer users have heard of the unix operating system... and the various PC versions of it... very few people ever get to know it well enough to realize what it can do. For one thing, it's inherently multi-user oriented, and allows one to run several programs for several users on one computer at the same time. We'll be looking at the true power of PC based unix next month.

Imprint for Amiga

The Amiga's superlative graphics are, sadly, not matched by a superlative colour printer as yet to truly do them justice in hard copy. The Imprint package gets around this by rendering them as unspeakably crisp Polaroid Palette photographs. We'll have a look at the images in the next Computing Now!.

These features are in an advanced state of preparation. However, in endeavouring to keep Computing Now! as up to the minute as possible we reserve the right to change the contents of this issue prior to going to press.

For Advertising and Subscription Information Call (416) 445-5600

COMPUTER PRESS

by Marie Hubbs

Picture Perfect Amiga

You can now use the Polaroid Palette to capture those spectacular colour pictures the Amiga can paint, using Imprint from *Liquid Light*. Producing slides, prints, transparencies and even colour separation negatives, owners of a Palette can upgrade their system for between five and six hundred dollars, which includes the software, interface and cabling.

The system is available from Polaroid Canada, at 350 Carlingview Drive, Rexdale, Ontario M9W 5G6, telephone (416) 675-3680, or Canada-wide toll free 1-800-268-690.

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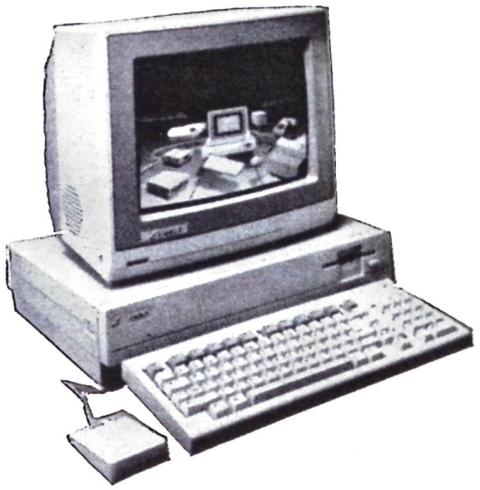
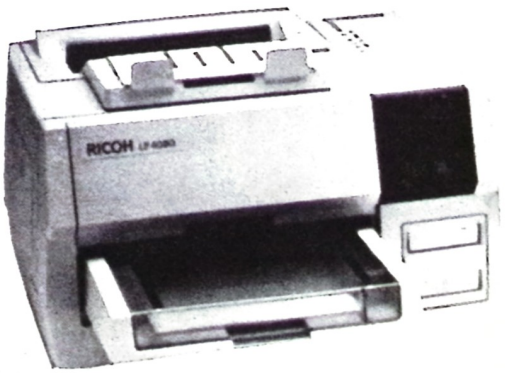


Laser Language

Designed specifically for large volume, multi-cycle documents, LaserScript from *Command Technology* uses a batch process with sophisticated pagination techniques to produce documents of five hundred pages or more. Featured also are fully integrated text and graphics including support for AutoCAD, In*A*Vision and Windows/Draw; table of contents, index and cross references, and automated document construction.

The cost is $495 plus $10 US for postage and handling, and volume discounts are available. For more information, call Command Technology, 1900 Mountain Boulevard, Oakland, California 94611, telephone (415) 339-3530.



Getting Together

● McKenzie Brown Canada is distributing a couple of network products, available at 267 Richmond Street West, Toronto, Ontario M5V 1W9, or by calling them at (416) 593-6880. Prices will, of course, depend on what configuration you're interested in.

TOPS Local Area Network from *Centram Systems West* connects microcomputers with different operating systems by translating local requests into universal requests recognizable by TOPS software on any other machine. It runs on AppleTalk or any similar twisted pair network cabling.

PhoneNET by *Farallon Computing* is an AppleTalk compatible LAN for Macintoshes which uses standard telephone cabling and supports different network configurations such as star, parallel, bus and daisy-chain. Using standard telephone or RJ11 connectors, workstations can be up to 3,000 feet apart without repeaters.

● Specifically designed to work on corporate LANs, PFS:Professional Network from *Software Publishing* provides concurrent network access to the PFS companion products... File, Write and Plan... with up to five user assignments. Personal subdirectories are automatically set up to protect individual system configurations.

Each Professional Network package will cost $729, and will be available through Ingram Software, 40-A Adesso Drive, Concord, Ontario L4T 2Y1, telephone (416) 738-1700.

Circle No. 35 on Reader Service Card

Getting Organized

Allowing users to plan projects completely onscreen, *Software Publishing*'s Harvard Total Project Management II offers four formats... interactive Work Breakdown Structure, PERT chart, Gantt chart or Task List. Flexible enough to address a wide range of user needs, HTPM II also features man-hour and overtime calculations, ASAP and ALAP scheduling and lag relationships.

At a price of $850, it is available in Canada from Ingram Software, 40-A Adesso Drive, Concord, Ontario L4T 2Y1, telephone (416) 738-1700.

Circle No. 34 on Reader Service Card

Magic Act

The long-awaited Magic Sac+ from *Data Pacific*, which allows Macintosh software to run on the Atari ST, is now available from STari Distributing, at an approximate price of $275. The package consists of a null-modem to hook the ST to the Mac, software utilities and transfer programs and the Mac ROMs in a cartridge to be plugged into the ST.

You can get ahold of STari Distributing through their parent company, JMG Software International, 801 Mohawk Road West, Hamilton, Ontario L9C 6C2, or by calling (416) 575-3201.

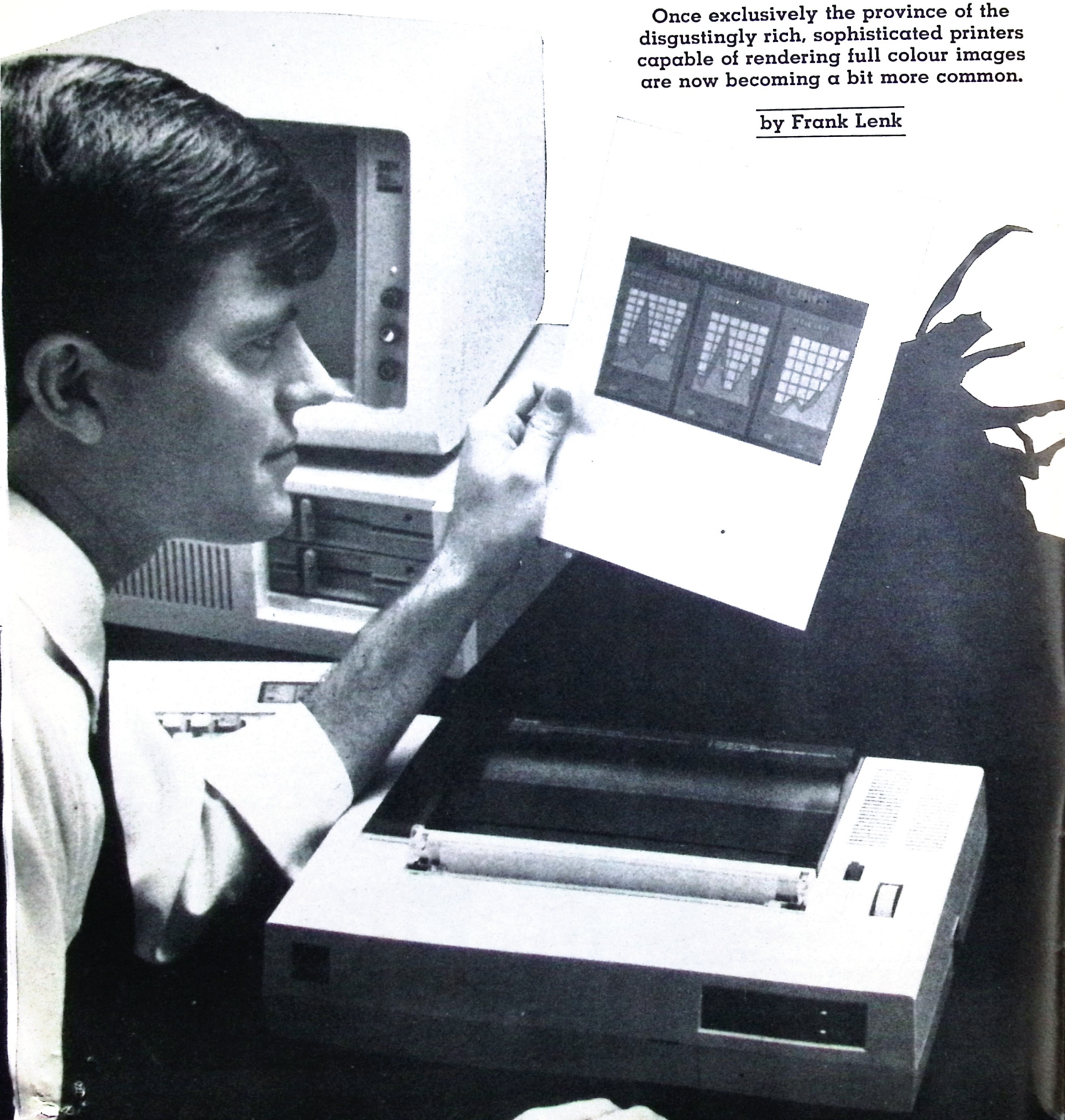
Circle No. 33 on Reader Service Card

Continued on page 58

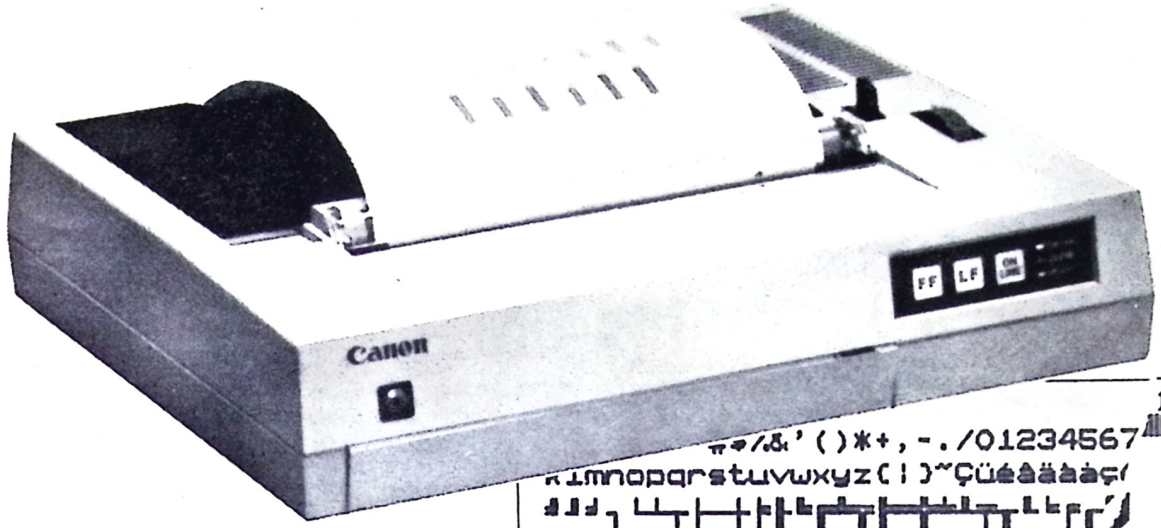
The State of Colour Printers

Once exclusively the province of the disgustingly rich, sophisticated printers capable of rendering full colour images are now becoming a bit more common.

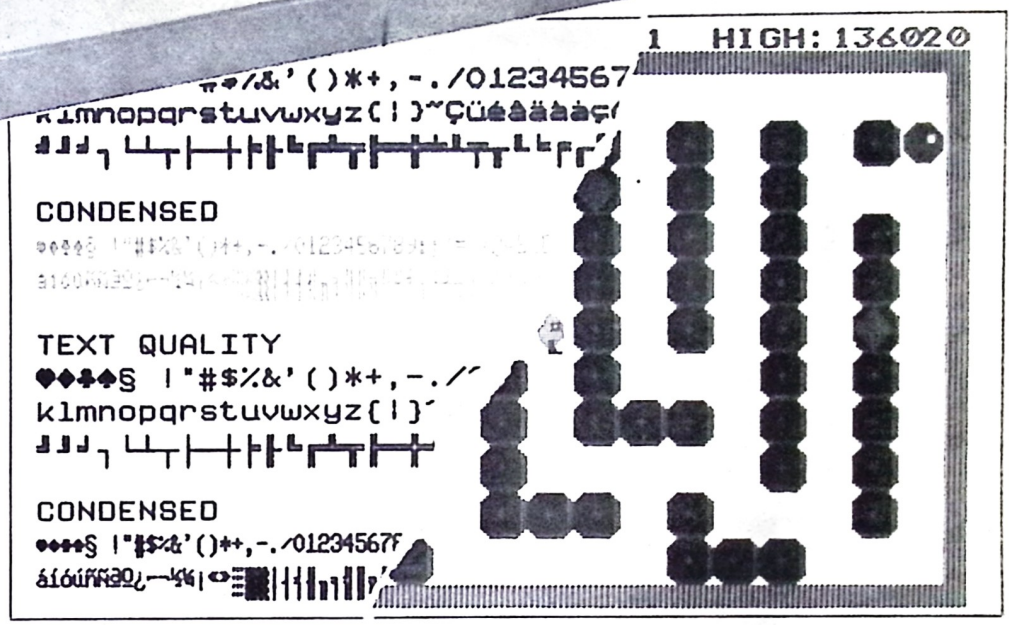
by Frank Lenk



The State of Colour Printers



The Canon PJ-1080A
(Also IBM Color Jetprinter).



The quality and capability of current graphics software is enough to stagger the imagination. Seeing all those multicoloured pixels floating across your screen is almost like a religious experience, the modern equivalent of gothic stained glass.

When you try to get a hard copy, however, it's like suddenly falling from grace. All those riotous glowing colours are drained and degraded, until nothing is left but a bunch of little black dots, speckled like flyspecks across the white of your page. It's quite a come down. One wonders what can be done about this.

You can seek out the aid of a mystical associate known as the "colour printer". These chimerical spirits are notoriously elusive. However, by dint of piety and meditation, I've managed to track not one but a small herd of them. As with most of these legendary creatures, the colour printer turns out to be part fact and part fiction. Yes, it does produce colour print... but no, it won't necessarily transform your drab, colourless existence into instant technicolour.

Black As Jet

The printers I looked at represented two types of technology... dot matrix and ink jet. I thought I'd rounded up two ink jet machines... the IBM Colour Jetprinter and the Canon PJ-1080A. Imagine my dismay when it turned out that the Canon and the IBM are really the same machine. The Canon has a cute multicoloured logo on it, and the IBM seems to have some extra text modes, but mechanically these two printers seem to be identical.

Regardless of the colour of the logo on the front, the hardware is very handsome indeed. The machinery is housed in an elegant rectangular box, with none of the obvious protuberances. If you use the special treated roll paper you're supposed to feed it with, you won't even have the usual pile of fanfold hanging about waiting to be ripped, smudged and tripped over. There's no paper feed knob sticking out the side. Instead, a thumbwheel sticks up slightly from the right hand top deck, serving the purpose very nicely. The paper feeds up and out of an almost vertical slot behind a thick strip of clear plastic. This clear window has a good clean edge on the back, which allows the paper to be torn off square.

Like most people, I'd heard rumours of how the early ink jet printers were troublesome and messy. My experience with the Canon and IBM printers lent no credence whatsoever to this kind of nasty innuendo.

Setting up the IBM... or the Canon... is a simple matter. First, plug in the power and data cords. Next, something a little different... unlocking the carriage and uncapping the ink supply. This is accomplished using a little blue lever recessed next to the paper feed roller. Turn the printer on, then shove the lever all the way down and hold it for a second or two. A light blinks on the front control panel for about ten seconds. When it goes out, stick your finger under the lever and pull it up... forcefully. It feels a bit like you're breaking something the first time you do this, but have faith and all will be well in the end.

This procedure primes the pump... removing the ink from the nozzle tips and refilling them with a fresh supply. The Canon manual warns that shock, vibration or air pressure and temperature changes could cause air bubbles to form... requiring a wait of several hours and some determined pumping to clear them. I had no problems at all during two weeks of intermittent fooling with the IBM machine, although I did have to do a single squeeze of the lever whenever I put the machine back in use after a few days of layoff.

This same lever should be used to lock the carriage and close off the ink supply if your printer is going on an extended furlough. Just turn on the power, push down and hold the lever and then release it. It should stay in the middle position, indicating that the printer is safe for storage or transportation.

The ink supply on these printers is easier to deal with than the ribbons on most impact printers. Inside a cover plate on the lower front of the printer you'll find two cartridges. These pull straight out with two fingers. The one on the left is for black ink, the one on the right for coloured... red, blue and yellow. Each plastic cartridge houses flat foil bags that contain the actual ink.

These cartridges seem to go a long way. After a week of running lots of solid colour graphic dumps I couldn't see any particular depletion of any of the ink reser-

voirs. When I shook the cartridges... the recommended method of checking the supply... there was lots of sloshing going on in there. The Canon manual specifies that a set of cartridges should be good for printing "more than eight rolls of paper per colour"... or three and a half million characters. Considering the hefty size of the paper rolls... about three inches across... this could be a life time supply.

I expected the special coated roll paper to be a lot more unpleasant than it was. Instead, I found that it has a slick feel... sort of like slightly glossy bond stock. It wouldn't be mistaken for typewriter paper, but it certainly is not objectionable in the way that most treated paper is. The roll that came with the IBM printer was very finely perforated into eleven inch pages... a nice touch.

Loading the paper is a snap. There are two studs on either side of the paper bin. One of the two studs pulls back on a spring while you insert the roll.

Amazingly, the IBM printer even has a little tiny tractor feed tucked in at the back... so snugly that it was a day or two before I even realized it was there. This tractor may be small, but it works as well as any I've seen. It's even positioned behind the rollers, so you don't have that problem with losing a clean sheet of paper every time you want to tear something off.

As for actually printing... that was the best part. Screen dumps came out wonderfully crisp, with incredibly vibrant colours. Even large areas of solid colour... including black backgrounds... reproduced evenly. The print colour is so good that it really highlights just how bad the PC's so called "colour graphics adapter" really is.

Printing is not lightning fast... but, by golly, it's *quiet*. The only sound these printers make is the soft whine of the gears and wheels going round as the print head sweeps back and forth.

Both ink jet printers seemed to make one pass per scan line of the picture. This is fine for graphics, but not so hot for text. The text speed is... to put it mildly... not fast. The text quality is good, but not phenomenal. On coated paper, text comes out sharp but not as robust and fully formed as you'd get from a good dot matrix printer. On regular paper the print is fuzzy.

Both the IBM and the Canon have a special technique for dealing with normal bond paper. There's a switch on the back to enable what's known as "bold" mode, which apparently spits the ink a bit more liberally onto the paper. For graphics this works quite well, although the colours are not quite as saturated on fanfold as on the coated paper, and the edges aren't as sharp. However, the graphics still look terrific... especially compared to any other type of print.

On the roll paper text came out clear and legible... fine for labelling a graph, but not exactly ideal for correspondence. The black type looked the sharpest for some reason. The main problem seems to be the default font. It's just too much like that coarse, square lettering that used to be all you could get out of a nine pin dot matrix. The IBM printer offers a letter quality mode that would be fine for the odd letter, provided you were willing to go with the special paper. Still, I'd love to see some fancy bit mapped fonts on either the IBM or the Canon.

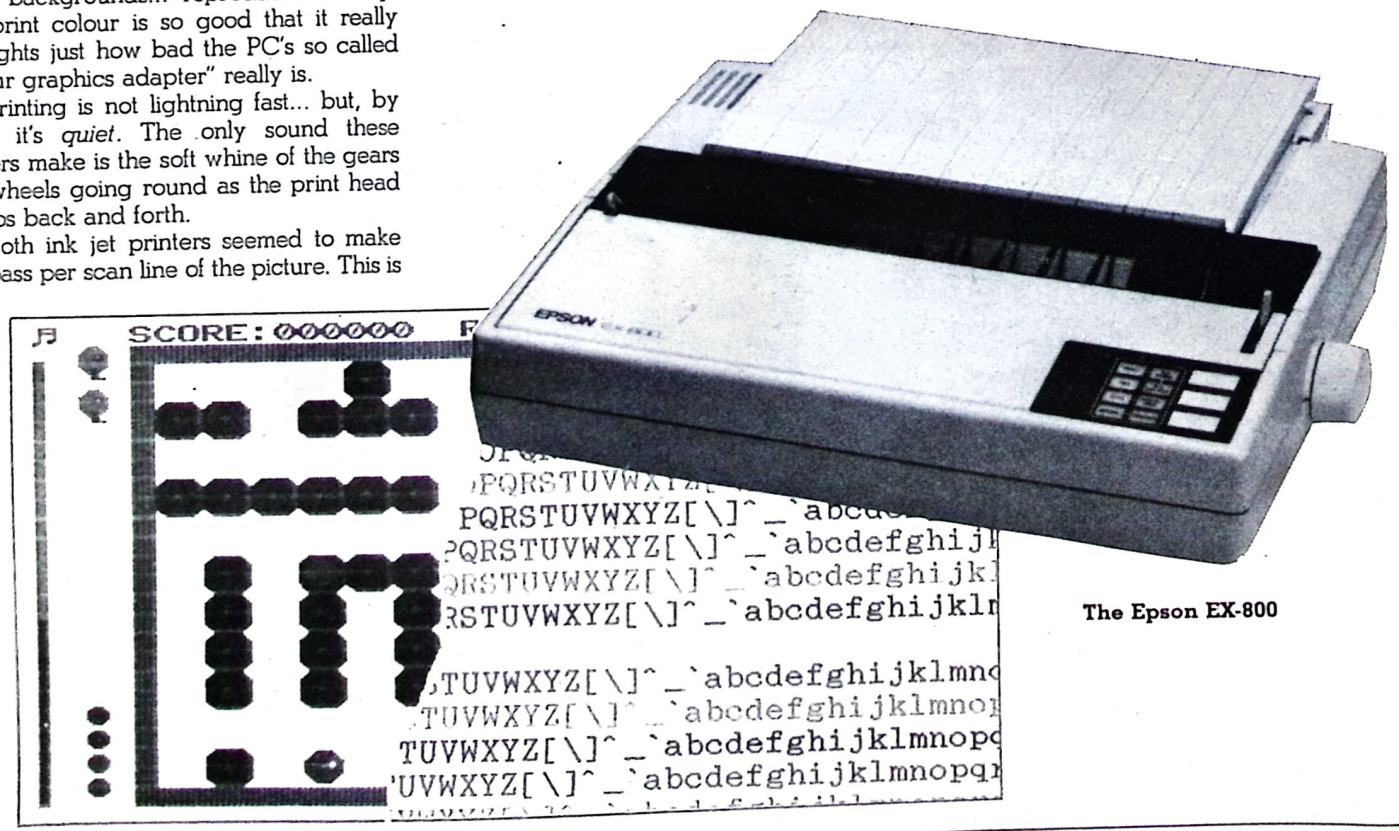
Epson Salts

Epson sort of defined the standard in dot matrix printers a few years back. The EX-800 and its wide carriage equivalent, the EX-1000, are the latest models to inherit this venerable lineage.

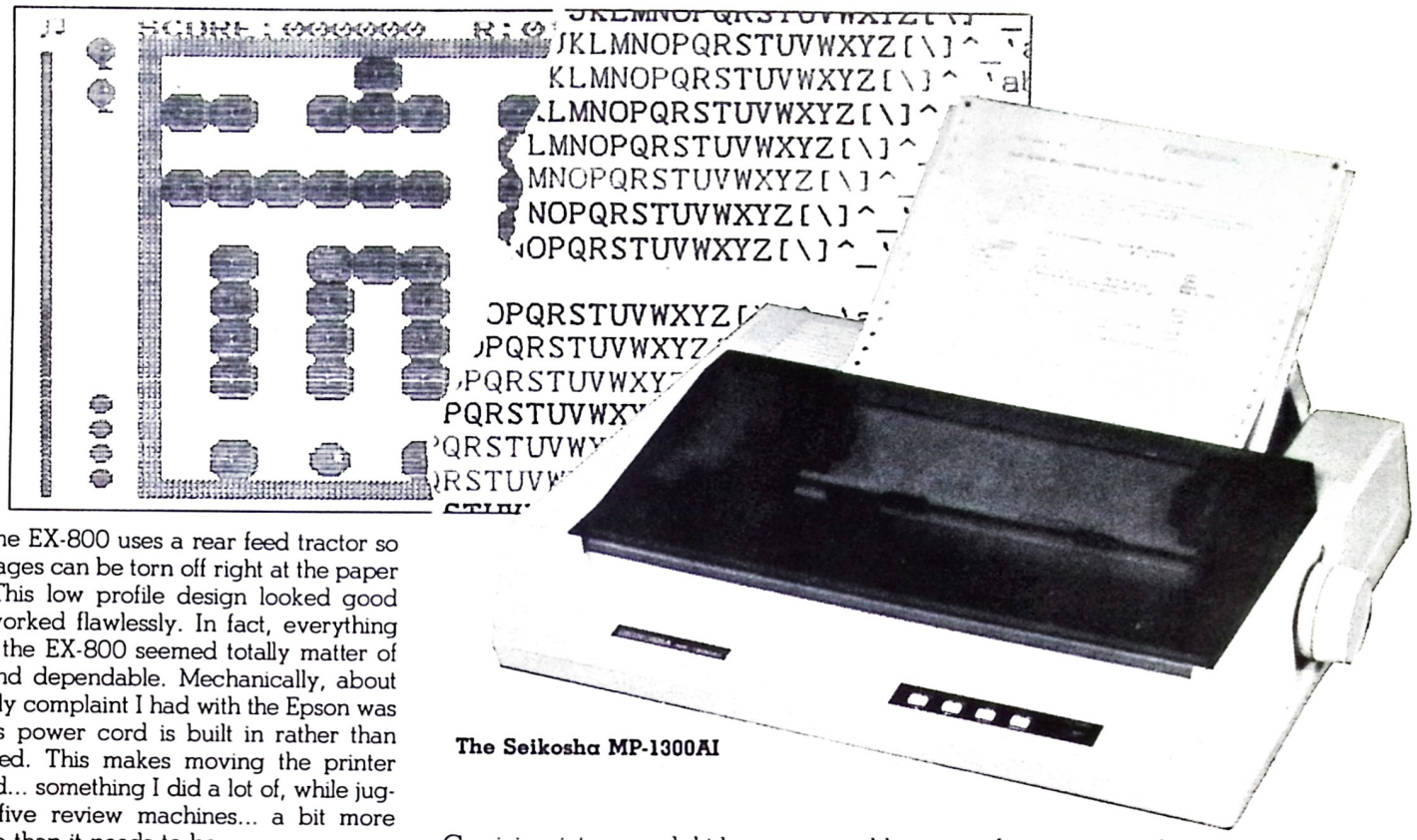
Like most of these high end matrix machines, the Epson is happy enough using solid black ribbons. To get colour out of it, you have to install an optional colour kit. This kit arrived in a small box and consisted of four items... a little phillips screwdriver, a matchbox sized thing that apparently contained the "colour select motor", a tiny bit of plastic known as a "lifting tool" and a colour ribbon cartridge. Unlike earlier Epson printers, the EX-800 uses the compact daisywheel type ribbon cartridges rather than the traditional Epson full width type.

Getting the colour kit installed is a tricky little job, but not beyond the capabilities of your average keyboard jockey. First you remove a screw that holds the bottom of the ribbon carriage. You lift the bottom plate out, revealing a rectangular cavity. From this you remove a wedge shaped plastic retaining pin. Then you stick the little lifting tool into a hole in the top of the colour motor to serve as a handle while you lower the motor into the cavity in your printer. Getting everything to line up takes a try or two, but then things click and you can put the cover plate back on and install the new colour ribbon.

Outside of this business, the EX-800 is mechanically much like its kinfolk in the Epson line... built like the proverbial brick building. Epson hardware always seems to be a bit bigger and heavier than that of the competition. I assume that this is indicative of a certain healthy overdesign in the major working parts.



The Epson EX-800



The Seikosha MP-1300AI

The EX-800 uses a rear feed tractor so that pages can be torn off right at the paper bail. This low profile design looked good and worked flawlessly. In fact, everything about the EX-800 seemed totally matter of fact and dependable. Mechanically, about the only complaint I had with the Epson was that its power cord is built in rather than socketed. This makes moving the printer around... something I did a lot of, while juggling five review machines... a bit more trouble than it needs to be.

The text output on the EX-800 is top notch. The manual rates its printing speed at up to three hundred sizzling characters per second in draft mode, and fifty in near letter quality mode. The latter mode produces a very attractive serif typeface in any number of colours. The EX-800 can be programmed either as an IBM or standard Epson, depending on its dip switch setting.

The graphics output was perhaps a bit above average compared to the other dot matrix printers I looked at. Even so, its colour saturation is poor unless you go to a multiple strike, high density mode. Large areas of solid colour... especially black... tend to show banding and mottling no matter what you do. However, the Epson was less inclined to show white gaps between its print lines than some of the other test printers.

Oh, Sei Can You See

The Seikosha MP-1300AI wasn't particularly the best of all the printers I looked at, but... outside of the ink jets and their dazzling graphics abilities... it was probably my favourite. I don't think I can afford to keep a printer around *just* for graphics. The Seikosha is more like the kind of printer I might buy.

The Seikosha takes an utterly conventional approach to all aspects of its design. Its colour capability is achieved by means of a four colour ribbon. The ribbon cartridge is the traditional Epson type... as wide as the paper you're printing on. The smoked plastic cover resembles that of the old Gemini printers, and hides a removable tractor also similar to that found on the Gemini. The Seikosha was the only printer I looked at that did not have a rear mounted tractor. You lose a sheet of paper here and there, but it feels a lot more positive and less likely to misfeed. That's just a feeling, mind you. With the exception of the Centronics, all the rear tractors worked flawlessly.

The colour support cartridge plugs into a cover plated slot hidden in the top of the printer, under the guide trays. A ribbon lifter installs across the front of the printer, ahead of the ribbon itself.

What's endearing about the Seikosha is a certain ingenuity with detail. The Seikosha, for instance, was the *only* printer I looked at on which the power and data cables were positioned out of the way of the paper feed. All the other printers... except the ink jets when using their internally mounted paper rolls... force you to run paper up over the bends and twists of their cables.

The Seikosha platen control is mounted concentrically with the manual paper feed knob on the right hand side of the machine. This control has an unusual way of flipping up the paper bail, so you don't have to lift the clear cover to feed it paper. In fact, there's a built in safety switch that prevents you from running the printer with the top cover open.

The customary... and usually unnecessary... paper separator trays at the back of the Seikosha are made to do double duty. By propping them up at an angle and using sliding guides mounted on the upper surface you use the trays as a cut sheet feeding system.

Yet another neat trick is the provision of a slot in the underside of the housing, so you can feed fanfold paper straight up through the bottom of the printer and out the back, giving you better control of where your input and output piles end up.

There's still more. A little lever on the lower right hand side of the printer gives you control over the distance between print head and paper. Most printers have this kind of control, but few... if any... make it so accessible. There are ten position detents.

This is a cute printer. It even plays a little tune when you run the self-test. The dip switch access has a plastic cover plate, to keep dust out of the back of your box. Unfortunately, the power switch is hidden at the back next to the power cable. Alas, you can't be right *all* the time. On the other hand, the Seikosha ties with the Epson for best documentation. Both have coil bound, well printed, clearly illustrated manuals... a pleasure to use. Inexplicably, the Seikosha manual doesn't draw attention to one of its best features... the fact that its command set emulates that of the well supported Epson JX-80.

The Seikosha's print speed is rated the same as that of the Epson, three hundred characters per second in draft mode, fifty in near letter quality. Its print quality is top drawer... easily equal to that of the Epson. Dark areas of colour had slightly more tendency to show white gaps than on the Epson, but this could be the luck of the draw, or the age of the ribbon. The dif-

ference wasn't much. Dark colours did tend to smear somewhat... a problem I cured using the head adjustment lever. Moving the head back a bit cured the problem completely, without noticeably affecting the print quality in any other way.

Centronics Interface

Centronics is another one of those big names in the print biz. The Printstation 260, like the Epson and Seikosha machines, uses a four colour ribbon to create dot matrix colour.

The Centronics was the only wide carriage printer I looked at for this review. It was by far the largest printer, and arrived in a box that looked big enough to contain a refrigerator... but which fortunately contained mostly empty air and foam packaging.

The Centronics was not only the largest of our test printers, it was also the least convenient... in numerous ways. It has no top cover, for instance. Instead, the entire top deck of the printer lifts up for access to the ribbon and tractor feed. This makes the rear mounted tractor difficult to get at. There's no manual paper advance knob, so you have to open the cover and use your thumb on a gear wheel.

Of course, there are lots of automatic controls for the paper feed. Unfortunately, they are not easy to figure out... mainly because the Centronics eschews the standard three or four button control panel in favour of a complicated series of buttons and an alphanumeric LED readout. Standard paper feed functions are confused with many other programming features, mainly because the control panel is forced to take over the configuration duties normally... and more effectively... handled by a bank of dip switches. The Centronics manual... a tacky, three hole punched affair... contains pages of instructions, flow charts and diagrams in a futile effort to make the control panel comprehensible.

To be sure, I did eventually get the thing to work... but some functions just never will be easy to use. For instance, setting the top of form is accomplished by *simultaneously* pressing form feed and line feed. If you hit either button just slightly ahead of the other... zoom, your paper feeds and loses the position you were carefully trying to set. Using the button panel to reconfigure the printer is a complex procedure, much more difficult than simply shifting dip switches. This is not something you want to access frequently, and far better tucked away somewhere at the back, out of the way.

What's worse, the Centronics insisted on throwing random form feeds for no apparent reason. Taking the printer off line, for instance, would often... but not always... spew a sheet out. I ended up literally wading through a crumpled pile of wasted white paper before I got the Centronics somewhat squared away.

The rear feed tractor worked well enough, but I found that the narrow paper I was using would frequently snag on the print head, tearing a perforation and forcing me to go through all that tedious top of form business yet again.

However, the text print quality was excellent, although its printing speed is not rated quite as high as the Epson or Seikosha... two hundred characters per second in draft mode, and forty characters per second in near letter quality.

The graphics colours looked about as good as those of the Epson or Seikosha, but the Centronics produced by far the worst proportion of white gaps between print lines. A test dump with a black background came out looking like a venetian blind. Still, for most work the Centronics gave good results, and the text was as good as any I've seen. The command set can emulate the IBM Colour Printer, so interfacing is no problem.

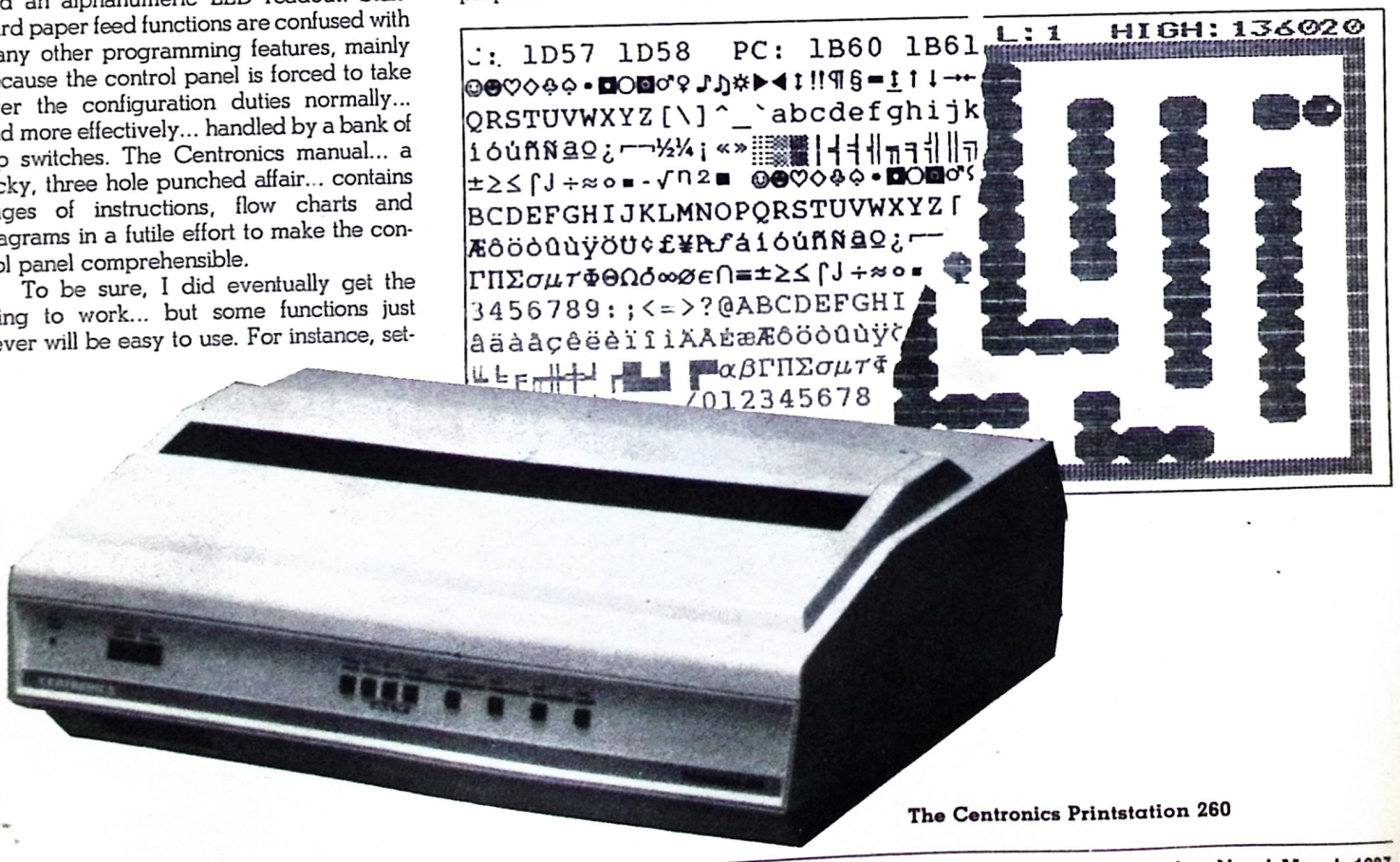
True Colours

As a rough guide, I timed each of the printers on a typical graphic screen dump, at several density settings. I used Pizazz software... reviewed in January '87.... to drive the printers, with identical printing parameters, as far as possible.

A typical graphic screen dump on the Epson took about a minute and twenty seconds at "medium" density, and about two and a half minutes at "high" density. The high density mode gave the best colour on all the dot matrix printers. Low density always looked pale and grainy, and "super high" density was too dark to show up the colours.

The Centronics ran at roughly the same speed as the Epson in medium density, but for some reason took over five minutes in its high density mode. The Seikosha was considerably slower in either mode... two minutes twenty seconds in medium density, four and a half minutes at high density.

My results on the IBM Jetprinter weren't entirely comparable, since I couldn't set it up for exactly the same image size, and the available density modes are different... "medium" and "low" only. However, the



The Centronics Printstation 260

IBM took just over three minutes at medium density, and about five and a half minutes at medium density with "bold" printing enabled. The comparable times for low density were two minutes twenty seconds and four minutes. Assuming that image size and speed are directly related, the IBM should produce graphics at almost exactly the same rate as the Epson in its high density mode. I didn't benchmark text printing, but the IBM would certainly compare speeds more favourably with a cheap daisywheel than with any dot matrix printer.

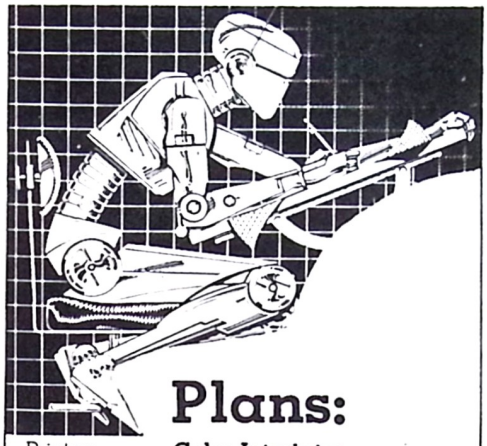
I'd love to present a final verdict for those who want to buy a colour printer, but the best I can do is more like a hung jury. There just is no one solution... although the various options are clear enough.

If *all* you want is to print colour graphics, you have no choice... buy an ink jet. You'll have to put up with slow text output, but you'll have gorgeous graphics... and the added bonus of total, blessed silence while you wait.

If you want an all round printer that can do the occasional Lotus colour graph, any of the dot matrix printers will do the trick. Your specific choice will be a subjective one, although I've attempted to cover some of the factors that might sway you one way or another.

Finally, if you want a "do everything" printer, that can do letter quality print... preferably at over two hundred characters per second... and then switch over and do crisp, colourful graphic artwork... you have only one possible course of action. Forget the whole thing, move to Tahiti and take up watercolours. I'd advise against cutting off an ear... technology marches on, and next year maybe we will finally see the printer of your dreams.

CN!



Plans:

Printer:	**Color Jetprinter**
Manufacturer:	**IBM, 350 Steeles Avenue East, Markham, Ontario L3R 2Z1; Product Centre (416) 364-5123**
Type:	**Ink jet**
Price:	**$599**
Availability:	**Call for nearest dealer**
Printer:	**PJ-1080A**
Manufacturer:	**Canon Canada, 6390 Dixie Road, Mississauga, Ontario L5T 1P7, (416) 678-2730**
Type:	**Ink jet**
Price:	**$995**
Availability:	**Call for nearest dealer**
Printer:	**EX-800**
Manufacturer:	**Epson Canada, Head Office 285 Yorkland Boulevard, Willowdale, Ontario M2J 1S5, (416) 495-9955**
Type:	**Dot matrix**
Price:	**$1,295**
Availability:	**Call for nearest dealer**
Printer:	**MP-1300AI**
Manufacturer:	**Seikosha**
Type:	**Dot matrix**
Price:	**$1,075; $260 colour option**
Availability:	**Select Marketing Group, 4801 Keele Street, Unit 42, Downsview, Ontario M3J 3A5, (416) 661-1678**
Printer:	**Printstation 260**
Manufacturer:	**Centronics Canada, Head Office 5170 Timberlea Boulevard, Unit B, Mississauga, Ontario L4W 2S5, (416) 625-0770**
Type:	**Dot matrix**
Price:	**$1,940 (parallel); $200 extra for serial**
Availability:	**Call for nearest dealer**

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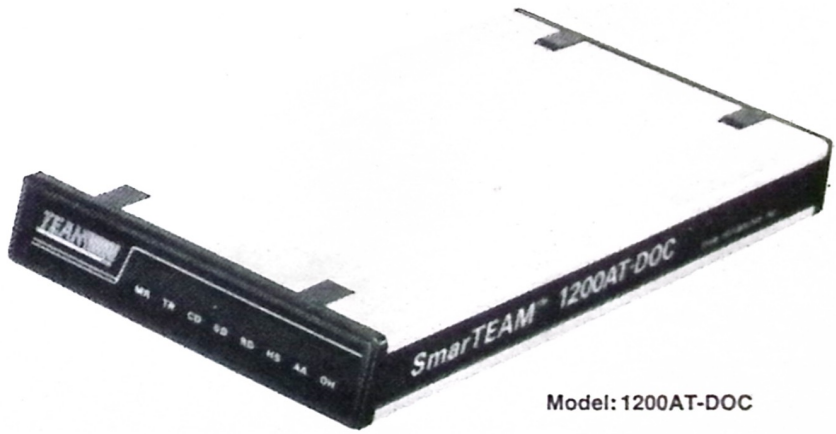

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The Pitchriders

The IVL Pitchriders convert sound into MIDI notes. The latest generation of this exciting box encompasses systems for both monophonic instruments and for polyphonic guitar.

by Steve Rimmer

In fact, when the dust has properly settled... and someone has traced their name in it for effect... there isn't a whole lot one can say about the IVL Pitchrider 4000. While inarguably useful, it isn't one of the more complicated MIDI devices. It takes pitches in and spits out MIDI data.

Unlike other boxes which have claimed to do similar functions, however, the Pitchrider actually works in a meaningful and useful manner. It doesn't impose too many restrictions on what's played into it, and really does serve as a useful alternative to playing everything on keyboards.

If you play something which doesn't relate well to keys... such as a flute, violin or even a guitar, as we'll get to... the Pitchrider is well worth considering as a way to get your music transmuted into computer data.

Slow Pitch

When you bang away at a MIDI keyboard the result of what you play... as far as the keyboard is concerned... is not sound, but, rather, numbers which describe some of the characteristics of the sound that will eventually spew from your speakers. The keyboard would, presumably, be connected to a MIDI sound source, which would translate the numbers into something more audible.

Of course, anything which was capable of generating suitable numbers could stand in for the keyboard, as the sound source wouldn't know where the numbers were coming from. A computer is often used to replace the keyboard. The Pitchrider replaces the computer.

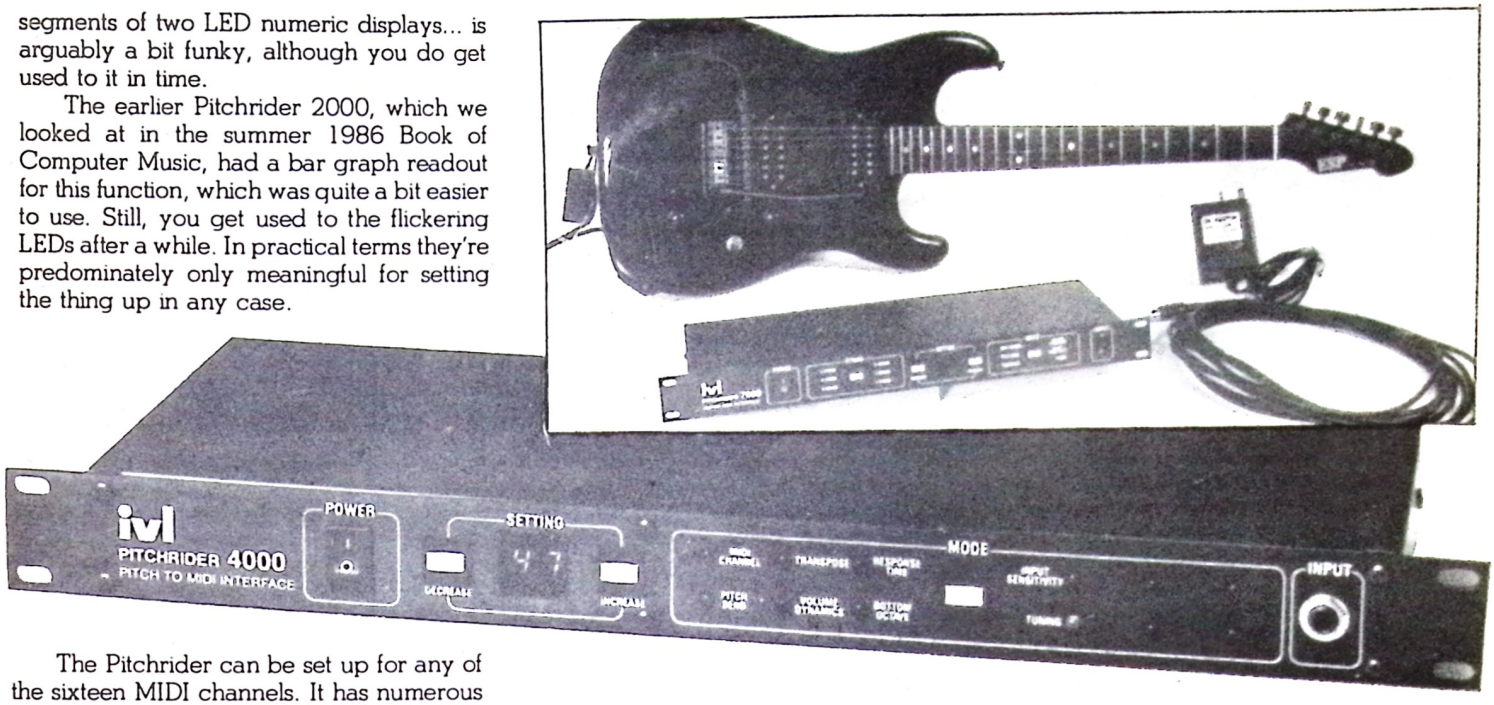
With enough chips and colourful electronic parts one could build a box which would be able to measure the frequency of a sound fed into it well enough to decide which of the hundred and twenty-seven possible MIDI notes it's closest to, and, subsequently, to send the appropriate number out onto the MIDI bus. This is the basis of the Pitchrider.

If you plug a microphone into the input of the Pitchrider and connect its MIDI output into something that can make noise... I used my faithful Yamaha DX-7... music played into the mike will spit out of the DX-7 in whatever voice the synthesizer has been set up for. The experience can be quite unusual at first... flute in, choir out. It gets weirder if you select something truly strange, like log drums, flexatone... the singularly most obnoxious synthesizer voice ever devised... or, my favourite, grand prix, which plays the sound of a car engine.

The Pitchrider is quite a bit more sophisticated than this, however. Far from being merely able to guess at the nearest semitone, it can tell you how close you are in absolute terms to the note you're trying to play. It's good to plus or minus four cents. Its method of communicating this to the real world... lighting up arbitary

segments of two LED numeric displays... is arguably a bit funky, although you do get used to it in time.

The earlier Pitchrider 2000, which we looked at in the summer 1986 Book of Computer Music, had a bar graph readout for this function, which was quite a bit easier to use. Still, you get used to the flickering LEDs after a while. In practical terms they're predominately only meaningful for setting the thing up in any case.



The Pitchrider can be set up for any of the sixteen MIDI channels. It has numerous adjustments to allow it to track the dynamics of various instruments. You can set the bottom octave... the lowest octave your flute or fiddle or whatever is likely to squeak in... which is eminently handy for avoiding spurious notes and improving its tracking. You can change the response time of the pitch conversion circuitry. If this is set low the thing will be good at playing lots of short, quick notes. However, for an instrument which is heavily into portamento... a violin comes quickly to mind... being able to lengthen this parameter makes the system less prone to playing little arpeggios when it isn't intended to.

You can also tune the Pitchrider to your instrument. This is very important, as even though the box likes to quantify everything into MIDI notes, it tracks worlds better if it has the same idea of what middle C is as does whatever's playing into it.

The set up procedure for the Pitchrider is a bit of a labour... like most MIDI instruments, it does a lot with very few buttons and lights. To this end, one has to push those buttons a lot to get anything done. Furthermore... unlike most MIDI instruments... it doesn't have a battery backed up parameter store, so you have to set it up manually every time you turn it on. These are minor details, to be sure.

Don't Fade Away

The Pitchrider 4000 is monophonic... it only wants to listen to one note at a time. There is a polyphonic version of it for use with a guitar, which we'll speak of momentarily.

The easiest way to get the Pitchrider together is to plug a microphone into its input and sing. You can "tune" your voice to it by watching the dancing LEDs and, unless you've forgotten to turn something on, your synthesizer will track your voice. You might want to get a set of large padded earphones for this exercise so that you can hear the MIDI music over your own voice.

I used a Radio Shack 33-1071 mike with the Pitchrider, a rather remarkable thing, actually. While fairly inexpensive as microphones go, it has an amazingly sharp carderoid pattern, and cuts out just about everything that's extraneous to what it's pointed at. This is important to the Pitchrider, as it will attempt to make MIDI music out of barking dogs, noisy hinges, cooling fans, effervescent wildebeests... anything it can hear. A good microphone can make a noticeable difference to it.

The most natural instrument for the Pitchrider is a flute. It produces pure sine waves... which the Pitchrider is most comfortable with, it seems... and is well suited to playing quickly with little or no variation in pitch. The Pitchrider can be set up to track quickly. Once I'd set up the tuning, response time and dynamics of the box to suit my flute, the whole affair came off sounding pretty tight.

A long time ago I discovered that one could play a sort of pawn shop level of saxophone with a flute by playing into a microphone connected to a fuzz box or, when times were really tough, into a slightly fractured amp. While timbrelly different, the phrasing and dynamics of a sax are a lot like those of a flute, and the effect more or less works. It's quite a trip to try it with a real sax voice controlled by the Pitchrider.

By comparison, the phrasing of a viol voice is very different from that of a flute, and setting up the DX-7 to play violin while I was tooling away on the flute didn't come off very convincingly. This isn't a fault of the Pitchrider... it's just that a flute doesn't make a good violin even if it can be made to sound like one.

Eventually I risked divorce and possible dismemberment by locating a violin... it had been very cleverly hidden... and playing that into the Pitchrider. Despite the more complex waveform spit out by a violin, the Pitchrider tracked it nicely. It wanted quite a different set of parameters from those I'd popped in for the flute... for example, as I noted above, the response time must be quite a bit longer for strings.

Like the flute, a violin works well as a controller for some sorts of voices and not for others. Playing it through a violin voice, for example, is a gas. It was the first time in my life that I'd managed to play a fiddle with perfect intonation and reasonable tone.

I did try running the Pitchrider 4000 with an electric guitar. This is great, so long as you don't play more than one note at a time. For practical purposes, this is impossible. It tracked the guitar perfectly if I played with one finger, but there is little useful stuff one can get together under these sorts of restrictions.

Higher Pitch

There is a completely different Pitchrider for guitar, the Pitchrider 7000. This consists of a rack mounted Pitchrider box, which looks a lot like the Pitchrider 4000 we've been talking about... and a special hex pickup dangling on the end of a cord which one is supposed to mount on one's axe.

As the mounting of the pickup is rather permanent... and I wasn't up for drilling holes into the body of my Travis... I checked out the Pitchrider 7000 down at the XL Computer Music Centre, where they've mutilated a Yamaha electric for the purpose. At the time they had the Pitchrider playing into the Roland S-50 sampling keyboard... a serious blast in its own right, and one we'll

Continued on page 18

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look at in a later magazine.

The Pitchrider 7000... once it's properly set up... is the most astounding MIDI guitar system you can imagine. It tracks perfectly, rarely burps unless you do something deliberately gauche and has almost godlike dynamics and response. It's fully polyphonic... you can even do something so crude as to strum it. It is sufficiently quick to have negligible settling time even on the lowest notes, which means that it won't have to sit and think for a second if you play the low E string open.

Unlike every other MIDI guitar I've tried, the Pitchrider didn't seem to be confused by unmuted open strings. It was faithful to even really fast finger picking. It managed pitch bends well. Fortunately the Yamaha guitar I was trying didn't have a whammy bar, so I never got to see what it could do with one. Damn shame, that.

If the system were set up with a voice that had a fairly fast decay there was little one couldn't do with it that one could manage on a normal electric guitar. There are a few restrictions imposed on one by the instrument, but they're far less onerous than those inherent in other MIDI guitar systems.

Most of the limitations one encounters in using the Pitchrider guitar come down as a result of the voices one chooses to play it through. I was quite taken by one of the sampled choir voices on the S-50, and spent a lot of time playing with it. Now, there are a lot of things that you could play on a guitar that you wouldn't want to try to get a choir to sing... even if they could manage it, the resulting music would sound dreadful. This is pretty much the same situation with the Pitchrider guitar. The box itself can often lay down MIDI data that the voice you've selected sounds ghastly playing.

While some of the other MIDI guitars I've encountered have proven interesting and potentially useful, the Pitchrider system is the only one that I'd consider actually trying to do anything serious with. It doesn't force one to adapt one's playing unduly, and seems to hold itself together well even if you abuse its trust a bit.

It's a notably worthwhile box.

Plans:

Hardware:	**Pitchrider 4000/7000**
Manufacturer:	**IVL, 19-3318 Oak Street, Victoria, British Columbia V8X 1R2**
Availability:	**XLelectronix Computer Music Centre, 317 College Street, Toronto, Ontario M5T 1S2, (416) 921-8941; toll-free orders only 1-800-387-6995**
Price:	**$599 (4000); $1,099 (7000), $99 for pickup**

Buy Canadian

It only seems right to point out that, unlike most MIDI instruments, the Pitchrider comes from British Columbia, not Japan. Its parent company, IVL, has been around for several years... mostly building better and better Pitchriders.

While there are a few things that could be improved in the controls of the Pitchrider, the actual functional bits of both of the systems we've looked at here are superb... far better than I'd have thought pitch to MIDI conversion could have gotten. If you play something other than keys you should check them out... they're a real good jam. **CN!**

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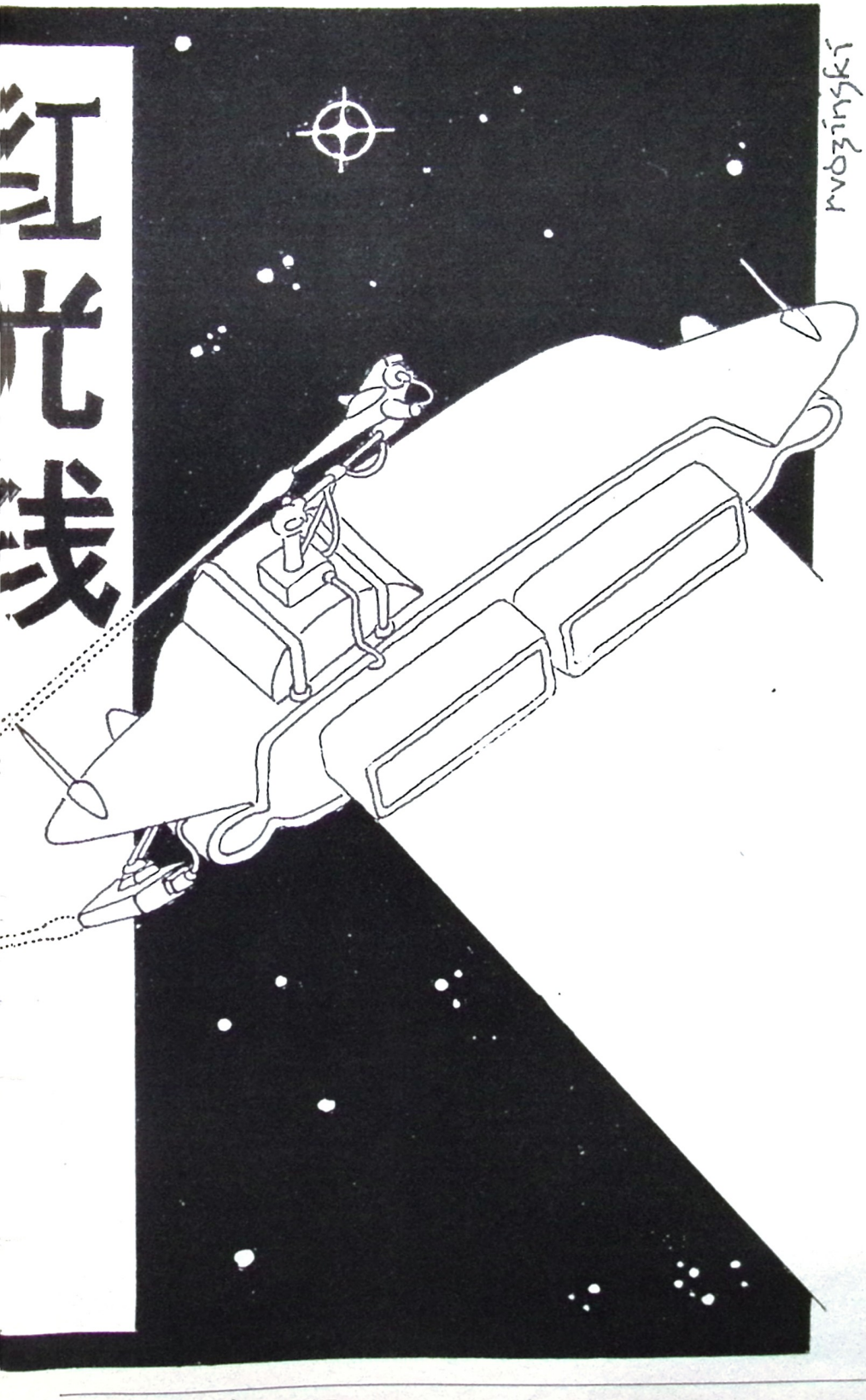
Laser Printer

by CN! staff

In our last big survey of printers, about eighteen months ago, there were only a handful of laser printers on the planet... now we're knee deep in them. Keep in mind that the bare facts listed here can't tell the full story. Not all laser printers are created equal, and not all are suitable for desktop publishing... for example, some can print a full page of graphics in top resolution while others can only manage it for half a page or less, and not every model prints in both landscape and portrait formats. Some laser printers are just smarter than others, and what you buy depends on what you're planning to print.

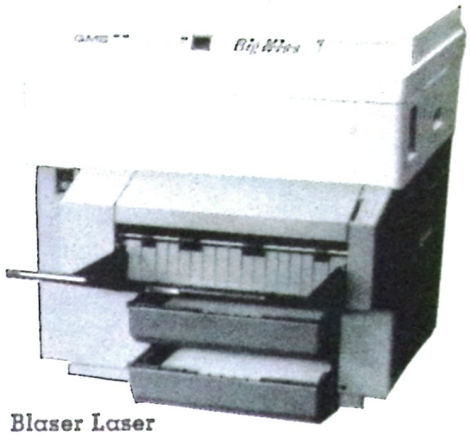
In the next few months we'll be peering more closely at laser printers... even reviewing specific models when we can get our hands on them... and will look particularly at how lasers fit into the whole desktop publishing scheme of things. So stay tuned.

Survey



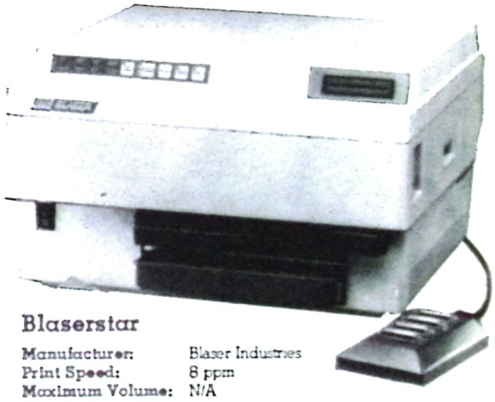
Big Kiss/Big Kiss II

Manufacturer:	QMS
Print Speed:	8 ppm
Maximum Volume:	35,000 pages/month; 10,000 II
Resolution:	300 dpi
Fonts:	Resident, host downloadable, cartridge
Interface:	Parallel standard, serial $150
Engine:	Canon KX, Canon CDX-II
Graphics Protocol:	N/A
Features:	Emulates Xerox, Qume, Epson, Diablo, ANSI X 3.64
Price:	$5,200; $7,259 II
Availability:	Watson Computer Products



Blaser Laser

Manufacturer:	Blaser Industries
Print Speed:	8 ppm
Maximum Volume:	N/A
Resolution:	300 dpi
Fonts:	Plug-in cartridges
Interface:	Parallel and serial standard
Engine:	Canon
Graphics Protocol:	N/A
Features:	Emulates IBM Graphics printer
Price:	$4,500 (list)
Availability:	Kaytronics



Blaserstar

Manufacturer:	Blaser Industries
Print Speed:	8 ppm
Maximum Volume:	N/A
Resolution:	300 dpi
Fonts:	Resident, downloadable and cartridges
Interface:	Serial and parallel
Engine:	Canon
Graphics Protocol:	PostScript
Features:	Emulates HP Laserjet, Diablo 630, Epson FX 80, IBM Graphics, Blasernet allows interface with up to 5 computers
Price:	$6,550 (list)
Availability:	Kaytronics

Genicom 5010

Manufacturer:	Genicom
Print Speed:	10 ppm
Maximum Volume:	N/A
Resolution:	300 dpi
Fonts:	6 resident, cartridges
Interface:	Parallel and serial
Engine:	N/A
Graphics Protocol:	IBM Graphics
Features:	Personality Modules emulate HP LaserJet Plus ($605), Diablo 630, IBM Graphics ($295)
Price:	$5,255 (Personality Modules extra)
Availability:	Canadian General Electric

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Unicalc also gives you new flexibility in window management. The window environment includes sizing and repositioning; vertical and horizontal scroll bars; page up, page down, page left and page right designators; close window designators; and pull down menus.

Because of its sparse matrix technology, Lattice's Unicalc has a jumbo-size memory—at least twice as large as other Amiga spreadsheets. And the memory is used dynamically: the greater the memory, the larger the spreadsheet.

A wide range of database functions is provided to fill ranges, perform queries on a database, and build tables based on various input data. What's more, this software package allows you to escape to CLI to perform AmigaDos functions.

Other outstanding features include: DIF, a file format which permits you to import and export your save files from other spreadsheets; Foreign Language versions; plus HIDE cell capability which allows you to hide a single cell, column of cells or a row of cells from the screen display.

To simplify operation, comprehensive context-sensitive HELP screens are always available, no matter where you are in the spreadsheet.

Despite all its features, Unicalc is the lowest cost spreadsheet for your Amiga PC—only $79.95. And a complete template pack is available for just $39.95. So, you can get the whole package for only $119.90. With that kind of performance and price, you'll agree that Lattice has just built a better mousetrap for your mouse driven Amiga PC.

Lattice

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Circle No. 42 on Reader Service Card

Laser Printer Survey

Image Station

Manufacturer: Imagen
Print Speed: 8 ppm
Maximum Volume: N/A
Resolution: 300 dpi
Fonts: Resident and plug-in cards
Interface: Serial and parallel standard
Engine: Canon CX
Graphics Protocol: Impress page description language
Features: Emulates Tektronix 4014, Epson FX series, Diablo, Qume
Price: $11,351
Availability: Ahearn and Soper

Imagen 3308

Manufacturer: Imagen
Print Speed: 8 ppm
Maximum Volume: N/A
Resolution: 300 dpi
Fonts: Resident and plug-in cards
Interface: Parallel, serial, Ethernet, mainframe
Engine: Canon CDX
Graphics Protocol: Impress page description language
Features: Emulates Epson, Tektronixs 4014
Price: $20,300
Availability: Ahearn and Soper

KISS

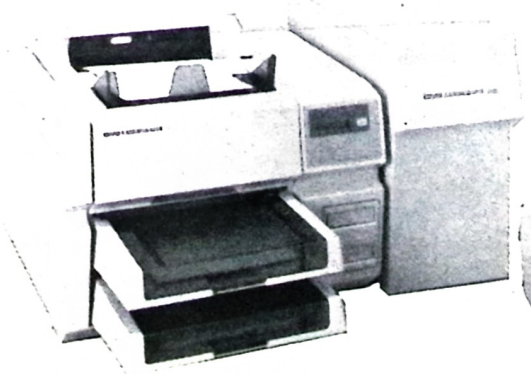
Manufacturer: QMS
Print Speed: 8 ppm
Maximum Volume: 3-5,000 pages/month
Resolution: 300 dpi
Fonts: 11 resident fonts; RAM downloadable
Interface: Parallel standard; serial optional ($150)
Engine: Canon CX
Graphics Protocol: N/A
Features: Emulates Epson FX-80, Diablo 630, Qume Sprint, Xerox 1720
Price: $3,995
Availability: Watson Computer Products

K8

Manufacturer: QMS
Print Speed: 8 ppm
Maximum Volume: 3-5,000 pages/month
Resolution: 300 dpi
Fonts: Resident and host downloadable
Interface: Parallel standard; serial kit $150
Engine: Canon CX
Graphics Protocol: N/A
Features: IBM Proprinter, Epson, Qume, and Diablo emulations available.
Price: $4,850
Availability: Watson Computer Products

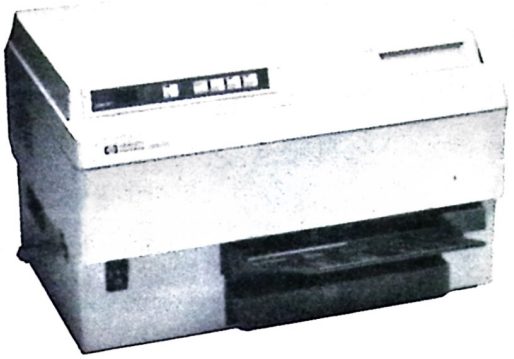
Lasergrafix series

Manufacturer: QMS
Print Speeds: 8 to 24 ppm
Maximum Volume: 3 to 30,000 pages/month
Resolution: 300 dpi
Fonts: 12 standard, others available
Interface: Serial and parallel
Engine: N/A
Graphics Protocol: TEX, QIUC (QMS page description language)
Features: Wide range of features, options
Price: From $13,000 to $49,000
Availability: Watson Computer Products



LaserJet

Manufacturer: Hewlett-Packard
Print Speed: 8 ppm
Maximum Volume: 4,000 pages/month
Resolution: 300 dpi
Fonts: Cartridge
Interface: Serial; HP-IB
Engine: Canon
Graphics Protocol: HPGL
Features: Up to 8 fonts per page; 59K user memory
Price: $4,796 (FST incl.)
Availability: Authorized H-P dealers



LaserJet Plus (Option 300)

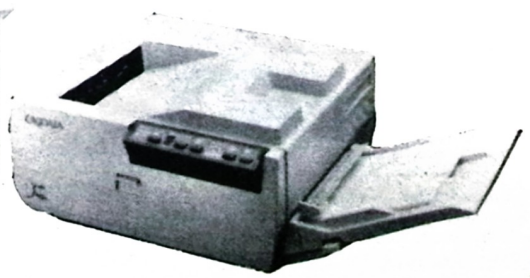
Manufacturer: Hewlett-Packard
Print Speed: 8 ppm
Maximum Volume: 6,000 pages/month
Resolution: 300 dpi
Fonts: Downloadable, cartridge
Interface: Serial and parallel
Engine: Canon
Graphics Protocol: HPGL
Features: Up to 16 fonts per page
Price: $6,525 (FST incl.)
Availability: Authorized H-P dealers

LaserJet 500 Plus

Manufacturer: Hewlett-Packard
Print Speed: 8 ppm
Maximum Volume: 6,000 pages/month
Resolution: 300 dpi
Fonts: Downloadable, cartridge
Interface: Serial and parallel
Engine: Canon
Graphics Protocol: HPGL
Features: Two paper trays; 395K user memory
Price: $8,491 (FST incl.)
Availability: Authorized H-P dealers

Laserline 6

Manufacturer: Okidata
Print Speed: 6 ppm
Maximum Volume: 3-5,000 pages/month
Resolution: 300 dpi
Fonts: 15 resident; cartridge and downloadable
Interface: Serial or parallel
Engine: N/A
Graphics Protocol: N/A
Features: Personality Modules emulate HP LaserJet (standard); Diablo, Epson, IBM, Qume, Okidata (optional)
Price: $3,316 (list); interface modules separate
Availability: CDI Computer Distribution

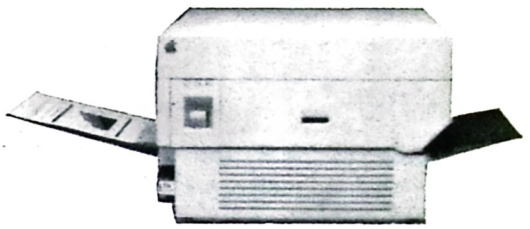


LaserTEN

Manufacturer: ITT Qume
Print Speed: 10 ppm
Maximum Volume: 5,000 pages/month
Resolution: 300 dpi
Fonts: 1 resident, downloadable, DigiFont cartridges
Interface: Plug-in modules, RS-232/Centronics
Engine: Hitachi
Graphics Protocol: PostScript compatibility for second quarter of '87
Features: Emulates H-P LaserJet, IBM, Qume, Epson
Price: $4-6,000 depending on options
Availability: Printerm

LaserWriter/Plus

Manufacturer: Apple
Print Speed: 8 ppm
Maximum Volume: N/A
Resolution: 300 dpi
Fonts: Downloadable
Interface: Serial, AppleTalk
Engine: Canon
Graphics Protocol: PostScript
Features: Four fonts standard, 11 for Plus; dealer installable upgrade kit from standard to Plus $1,310
Price: $8,195, $9,495 Plus;
Availability: Authorized Apple dealers



LBP-200S A1/A2

Manufacturer: Canon
Print Speed: 8 ppm
Maximum Volume: N/A
Resolution: 300 dpi
Fonts: Built-in, downloadable, plug-in cartridges
Interface: Parallel or serial
Engine: Canon
Graphics Protocol: Bit-mapped, raster and vector graphics
Features: Built-in memory, 128K (A1), 1 125K (A2); Diablo 630 emulation; consumables in cartridge form
Price: $4,495 (A1); $6,495 (A2)
Availability: Canon

LIPS 10

Manufacturer: C Itoh
Print Speed: 10 ppm
Maximum Volume: 15,000 pages/month
Resolution: 300 dpi
Fonts: Resident, downloadable, cartridges; bit mapped
Interface: Serial and parallel
Engine: Konica
Graphics Protocol: LIPS Command Language
Features: Emulates Diablo 630, Epson FX-80, HP LaserJet
Price: $5,596
Availability: Canada

LJ-10

Manufacturer: Corel Systems
Print Speed: 10 ppm
Maximum Volume: N/A
Resolution: 300 dpi
Fonts: Over 40 resident, others downloadable
Interface: Serial and parallel
Engine: N/A
Graphics Protocol: Raster and vector graphics
Features: Emulates HP LaserJet Plus, Epson FX-80, Qume Sprint 11, NEC Spinwriter 3550, IBM Graphics printer; part of complete turnkey desktop publishing system; network capabilities
Price: $5,795 (list)
Availability: Corel Systems

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Calendar This program prints up a calendar for any month in the twentieth century. It's very useful if you want to know which days people were being idle on in 1921, for example.

DFA This is a really strange disk accelerator program which attempts to anticipate which sectors your software will call for and fetch them when the computer isn't busy. It can speed up some sorts of programs quite noticeably.

FSDebug Essentially this thing does the same thing as the DOS DEBUG program, but it does it so nicely. You can scroll forward and backward through a disassembly, set breakpoints, trace code and so on, all with a full screen display.

Macshow This program allows you to look at Macintosh MacPaint image files on a PC. It will also print them and convert them to PC compatible bit maps. Several sample pictures are included. Requires a colour card.

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GRAB.ASM This is the source file for the graphics grab program in the March 1987 edition of Computing Now! Requires MASM to assemble.

PLAYSONG This is the source code for the linkable interrupt driven music playing package from the March 1987 edition of Computing Now! It also includes the MUSIC.C demonstration program. Requires MASM to assemble and a C compiler to deal with the demo.

Scroll This is a resident scroll lock key enhancement. It's not all that exciting, but, then, at two hundred and forty-seven bytes it's not all that big either.

Sideways This thing lets you print awkward sized documents sideways on an Epson printer.

Willy The Worm This is a really fast graphic game in which you try to get willy the worm home. It's extremely strange.

ZapDraw2 This is the C language source file and updated header file for the text and graphics module from the February edition of Computing Now! It embodies several significant enhancements over the published version, including a writing speed increase of about ten times. Requires ZAP1.C from our volume twenty disk and a C compiler.

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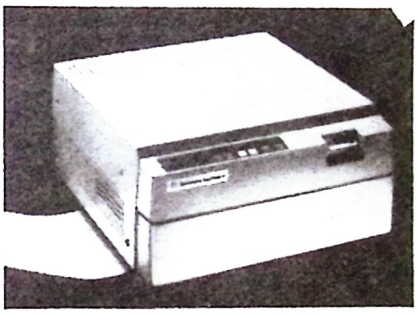

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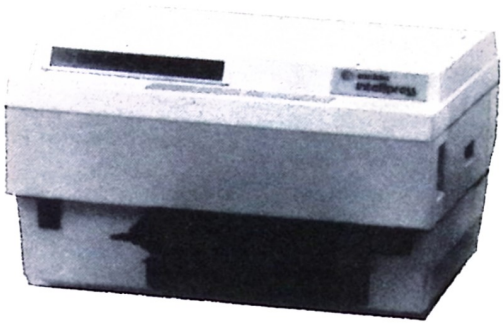
Laser Printer Survey

LN03/LN03 PLUS

Manufacturer: Digital Equipment
Print Speed: 8 ppm
Maximum Volume: 3,500-5,000 pages/month
Resolution: 300 dpi
Fonts: 16 resident, downloadable, cartridges
Interface: Serial
Engine: Ricoh
Graphics Protocol: PostScript
Features: Full page bit-mapped graphics compatible with DEC's "Sixels" and Tektonic's 4010/4014 graphics protocol; /PLUS includes 1 megabyte memory standard.
Price: $5,373; $7,678/PLUS
Availability: Digital Equipment of Canada

LP-300/300X ("Desktop Printshop")

Manufacturer: Cordata
Print Speed: 8 ppm
Maximum Volume: N/A
Resolution: 300 dpi
Fonts: 38 resident, others optional
Interface: Plug-in card
Engine: Cordata
Graphics Protocol: N/A
Features: Emulates Epson; part of Intellipress desktop publishing system.
Price: $4,995 (300-list); $6,670 (300X-list)
Availability: CDI Computer Distributions



LZR 2600 series

Manufacturer: Dataproducts
Print Speed: Up to 26 ppm
Maximum Volume: Up to 80,000 pages/month
Resolution: 300 dpi
Fonts: 13 resident, others downloadable
Interface: Parallel, serial, AppleTalk
Engine: Toshiba
Graphics Protocol: PostScript
Features: Emulates Diablo 630, supports Unix, TranScript; up to 11 by 17 inch paper
Price: Ranges from about $20-30,000
Availability: Printerm

MT910sl

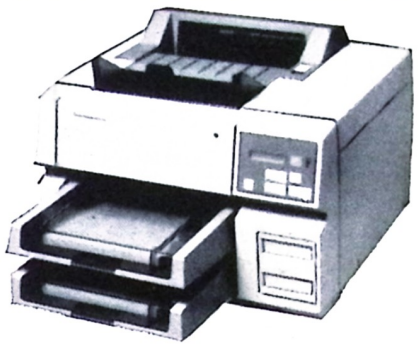
Manufacturer: Mannesmann Tally
Print Speed: 10 ppm
Maximum Volume: 5,000 pages/month
Resolution: 300 dpi
Fonts: 2 resident; cartridges and downloadable
Interface: Plug-in modules, parallel or serial, or optional 4-user serial
Engine: Kyocera
Graphics Protocol: HPGL
Features: Emulates Diablo 630, Epson FX, IBM Proprinter, HP LaserJet, Qume Sprint 11
Price: $6,575
Availability: Mannesmann Tally

Multiwriter V/VI/VII

Manufacturer: Ahearn and Soper
Print Speed: 8 ppm/15 ppm for VIII
Maximum Volume: 35,000 pages/month
Resolution: 300 dpi
Fonts: 6 bit-mapped standard, downloadable
Interface: Parallel or serial
Engine: Canon CX; Ricoh 4080 for VI
Graphics Protocol: Express page description language
Features: Emulates Diablo, Qume, HP LaserJet, NEC, Epson
Price: $6,776 V/VI; $12,000 VIII
Availability: Ahearn and Soper

OmniLaser 2015

Manufacturer: Texas Instruments
Print Speed: 15 ppm
Maximum Volume: 25,000 pages/month
Resolution: 300 dpi
Fonts: 2 cartridge slots
Interface: Serial, parallel
Engine: Ricoh 4150
Graphics Protocol: N/A
Features: Emulates Diablo 630, HP LaserJet, TI 855 DP/WP
Price: $5,995 (US) list
Availability: Texas Instruments authorized dealers



OmniLaser 2108

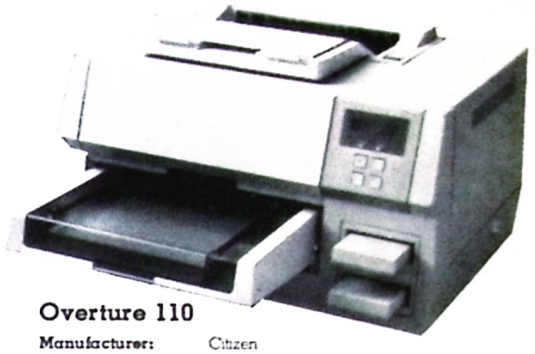
Manufacturer: Texas Instruments
Print Speed: 8 ppm
Maximum Volume: 10,000 pages/month
Resolution: 300 dpi
Fonts: Downloadable, 2 cartridge slots
Interface: Serial, parallel, AppleTalk
Engine: Ricoh 4081
Graphics Protocol: PostScript, HPGL
Features: Emulates Diablo 630, HP LaserJet Plus, HP 7475 Plotter, TI 855 DP/WP
Price: $5,995 (US) list
Availability: Texas Instruments authorized dealers

OmniLaser 2115

Manufacturer: Texas Instruments
Print Speed: 15 ppm
Maximum Volume: 25,000 pages/month
Resolution: 300 dpi
Fonts: Downloadable, 2 cartridge slots
Interface: Serial, parallel, AppleTalk
Engine: Ricoh 4150
Graphics Protocol: PostScript, HPGL
Features: Emulates Diablo 630, HP LaserJet Plus, HP 7475 Plotter, TI 855 DP/WP
Price: $7,995 (US) list
Availability: Texas Instruments authorized dealers

Opus 2E

Manufacturer: Facit
Print Speed: 8 ppm
Maximum Volume: 10,000 pages/month
Resolution: 300 dpi
Fonts: 6 resident, downloadable, plug-in cartridges
Interface: Serial and parallel
Engine: Ricoh 4080
Graphics Protocol: Raster, line and box drawing
Features: Emulates HP LaserJet, IBM Proprinter, Diablo 630; forms capability
Price: $6,495 (list)
Availability: Lanpar

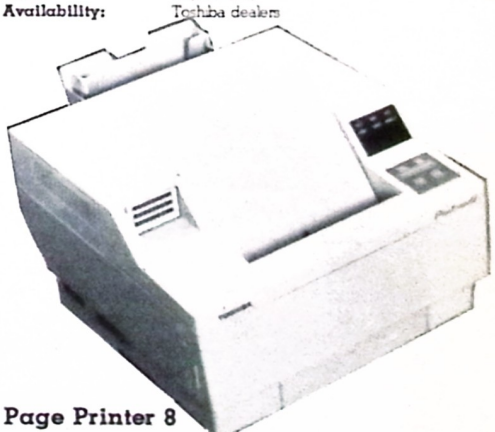


Overture 110

Manufacturer: Citizen
Print Speed: 10 ppm
Maximum Volume: 5,000 pages/month
Resolution: 300 dpi
Fonts: 6 resident, downloadable
Interface: Serial and parallel standard
Engine: N/A
Graphics Protocol: Full page text and bit map graphics
Features: Emulates Epson FX 286, IBM Proprinter, Diablo 635, .512K RAM memory
Price: $3,995
Availability: Technical Logistics Support (TLS)

PageLaser 12

Manufacturer: Toshiba
Print Speed: 12 ppm
Maximum Volume: 10,000 pages/month
Resolution: 300 dpi
Fonts: 3 resident, downloadable, cartridge
Interface: Serial and parallel
Engine: Toshiba
Graphics Protocol: N/A
Features: Emulates Diablo 630, IBM Graphics printer, Qume Sprint 11, Toshiba, HP LaserJet Plus optional
Price: $5,999 (list)
Availability: Toshiba dealers



Page Printer 8

Manufacturer: Centronics
Print Speed: 8 ppm
Maximum Volume: 5,000 pages/month
Resolution: 300 dpi
Fonts: Resident; additional font cards
Interface: Parallel or serial or IEEE
Engine: Sharp
Graphics Protocol: N/A
Features: Emulates Diablo 630, Epson FX-80, IBM Proprinter and Graphics printer, H.P LaserJet
Price: $3,995
Availability: Canada

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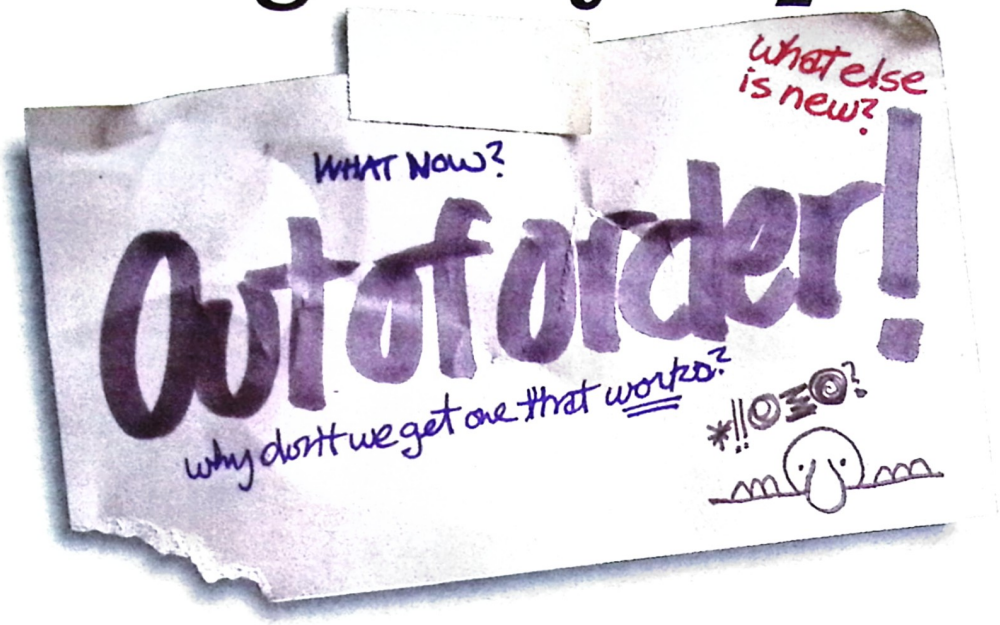

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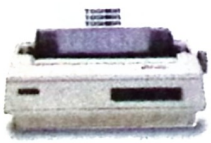

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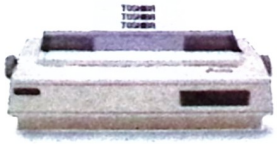
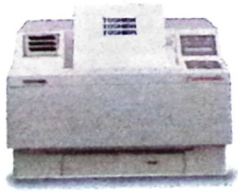
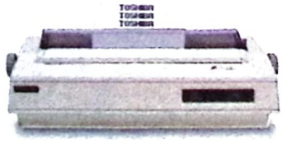


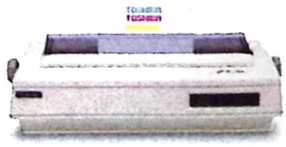
P341e
The most competitive quality printer.



PageLaser 12
The class of desktop laser printers.



P351 Model 2
The ultimate performance printer.



P351C
The optimum colour printer.

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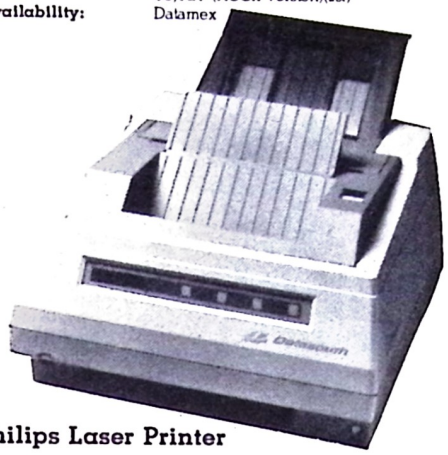
Laser Printer Survey

PageWriter 8

Manufacturer: Datasouth
Print Speed: 8 ppm
Maximum Volume: 5,000 pages/month
Resolution: 300 dpi
Fonts: 3 resident, cartridges
Interface: Serial and parallel
Engine: NEC LED Array Technology
Graphics Protocol: N/A
Features: Emulates Epson Fx 80, Diablo 630, HP LaserJet; coax and twinax models $8,527 (list)
Price: $5,727 (ASCII version)(list)
Availability: Datamex



Philips Laser Printer

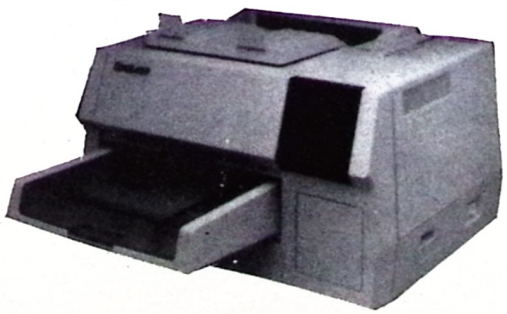
Manufacturer: Philips
Print Speed: 8 ppm
Maximum Volume: N/A
Resolution: 300 dpi
Fonts: 7 standard, 8 font cartridges
Interface: RS-232
Engine: QMS Canon
Graphics Protocol: N/A
Features: Compact footprint, quiet
Price: $6,300
Availability: Philips Information Systems

PostScript 800/800+

Manufacturer: QMS
Print Speed: 8 ppm
Maximum Volume: 3,500 pages/month
Resolution: 300 dpi
Fonts: /13 resident, downloadable
Interface: Serial, AppleTalk
Engine: N/A
Graphics Protocol: PostScript
Features: /35 resident fonts (800+)
Price: $8,195 (800); $8,995 (800+)
Availability: Watson Computer Products

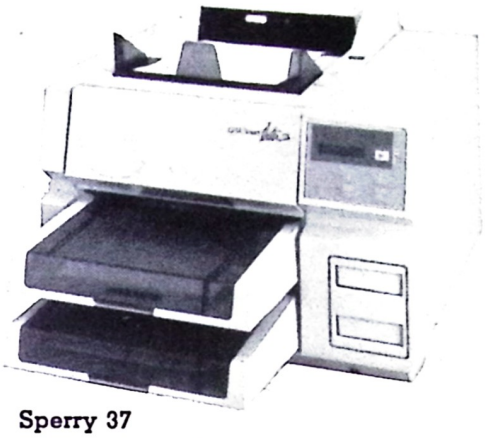
QuadLaser PP8 (Power Printer)

Manufacturer: Quadram
Print Speed: 8 ppm
Maximum Volume: 10,000 pages/month
Resolution: 300 dpi
Fonts: 2 resident, 70 downloadable; bit-mapped
Interface: Parallel or serial
Engine: Ricoh
Graphics Protocol: HPGL, scLASERplus
Features: Emulates IBM Proprnter, Epson FX-80, Qume Sprint 5, HP LaserJet; Lotus driver available; other configurations available e.g. Dedicated Workstation.
Price: $7,195
Availability: Chevco



SmartWriter 80+/150

Manufacturer: QMS
Print Speed: 8/15 ppm
Maximum Volume: 5,000/25,000 pages/month
Resolution: 75/150/300 dpi
Fonts: 19 resident, cartridge and host downloadable
Interface: Parallel and serial standard
Engine: Canon CX
Graphics Protocol: Bit-mapped; ANSI X3.64 graphics (150)
Features: Emulates Epson FX-80, Qume Sprint, Diablo 630
Price: $7,425 (80+); $11,295 (150)
Availability: Watson Computer Products

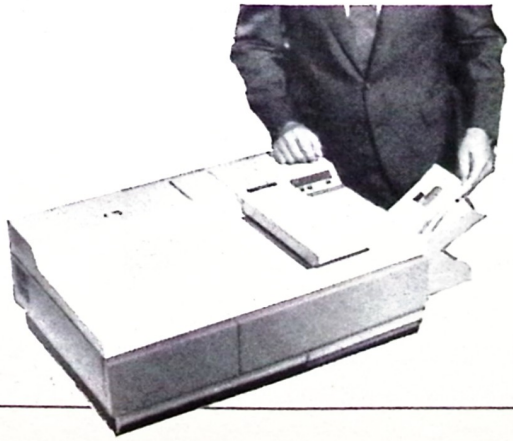


Sperry 37

Manufacturer: Kyocera
Print Speed: 10 ppm
Maximum Volume: 5,000 pages/month
Resolution: 300 dpi
Fonts: Up to 63 built-in; downloadable
Interface: Parallel and serial standard
Engine: Kyocera
Graphics Protocol: Express programming language
Features: Emulates IBM Graphics printer, Diablo 630, NEC 3550, Qume Sprint 11, Epson FX-80, H-P LaserJet, Sperry 949 line printer
Price: $5,687
Availability: UNISYS Canada

Xerox 4045 Laser CP

Manufacturer: Xerox
Print Speed: 10 ppm
Maximum Volume: 10,000 pages/month
Resolution: 300 dpi
Fonts: 2 default fonts, downloadable, 4 plug-in cartridges slots
Interface: Serial and parallel, Interface Sharing Device option with 256K buffer ($1,750)
Engine: Xerox
Graphics Protocol: Bit-mapped or raster image
Features: Photocopier option; emulates Diablo 630, H-P LaserJet, Epson FX-80,includes more than 60 fonts on MS-DOS disk; Shazam software driver ($60); forms capability
Price: $7,150 (printer alone); $7,450 (including copier)
Availability: Xerox



Xerox 2700-II

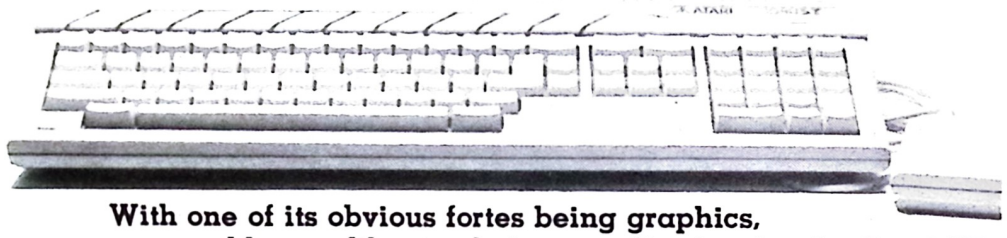
Manufacturer: Xerox
Print Speed: 12 ppm
Maximum Volume: 20,000 pages/month
Resolution: 300 dpi
Fonts: 2 default fonts, downloadable, 4 plug-in cartridges slots
Interface: Serial and parallel; Interface Sharing Device option with 256K buffer ($1,750)
Engine: Xerox
Graphics Protocol: Bit-mapped or raster image
Features: (Same as 4045) two paper trays
Price: $19,500 (list)
Availability: Xerox

Sources:

● Ahearn and Soper, 100 Woodbine Downs Boulevard, Rexdale, Ontario M9W 5S6, (416) 675-3999 ● Apple Canada, call for nearest authorized dealer, (416) 477-5800 ● Canadian General Electric, Data Systems, 396 Attwell Drive, Rexdale, Ontario M9W 5C3, (416) 620-2100 ● Canasia Computer Products, 441 Esna Park Drive, Unit 13, Markham, Ontario L3R 1H7, (416) 477-2313; toll free in Canada 1-800-387-9775 ● Canon Canada, 6390 Dixie Road, Mississauga, Ontario L5T 1P7, (416) 678-2730 ● Centronics Canada, 5170 Timberlea Boulevard, Unit B, Mississauga, Ontario L4W 2S5, (416) 625-0770; in Quebec (514) 636-6451; in Calgary (403) 250-7622; in Vancouver (604) 251-3111 ● CDI Computer Distribution, 222 Yorkland Boulevard, Willowdale, Ontario M2J 1R5, (416) 495-1817; order desk 1-800-268-3422 ● Chevco Computing, 6581 Kitimat Road, Unit 14, Mississauga, Ontario L5N 2X5, (416) 821-7600 ● Compuserve, 43 Riviera Drive, Markham, Ontario L3R 5J6, (416) 477-8088 ● Corel Systems, 1600 Carling Avenue, Ottawa, Ontario K1Z 7M4, (613) 728-8200, or (416) 928-3110 in Toronto area; toll free 1-800-267-9935 ● Datamex, 115 Norfinch Drive, Downsview, Ontario M3N 1W3, (416) 665-1808 ● Dataproducts Canada, 15 West Pearce Street, Richmond Hill, Ontario L4B 1H6, (416) 886-2505 ● Digital Equipment of Canada, 505 University Avenue, Suite 1100, Toronto, Ontario M5G 2H2, (416) 597-3157 ● Hewlett-Packard (Canada), 6877 Goreway Drive, Mississauga, Ontario L4V 1M8, (416) 678-9430 ● IBM Canada, Product Sales, 3500 Steeles Avenue East, Markham, Ontario L3R 2Z1, (416) 296-3555 ● Kaytronics, 331 Bowes Road, Unit 1, Concord, Ontario L4K 1J2, (416) 669-2262; in Vancouver (604) 581-5005; in Ottawa (613) 564-0080; in Montreal (514) 367-0101 ● Mannesmann Tally, 125 Traders Boulevard, Unit 9, Mississauga, Ontario L4Z 2E5, (416) 890-4646 ● Philips Information Systems, 1200 Sheppard Avenue East, Willowdale, Ontario M2K 2S5, (416) 494-8111 ● Printerm Data Systems, 40 Kodiak Crescent, Unit 2, Downsview, Ontario M3J 9Z9, (416) 630-2400 ● Technical Logical Support (TLS), 3255-14th Avenue, Markham, Ontario L3R 2L6, (416) 479-1911 or (416) 494-1719 (Tor); in Quebec (514) 334-2661, in Calgary (403) 291-4844, in Vancouver (604) 273-6344 ● Texas Instruments, Data Systems Group, 41 Shelley Road, Richmond Hill, Ontario L4C 5G4, (416) 884-9181 ● Toshiba of Canada, 500 Alden Road, Markham, Ontario L3R 5H5, (416) 479-4004 ● UNISYS Canada Inc., 2001 Sheppard Avenue East, North York, Ontario M2J 4Z7, (416) 495-0515 ● Watson Computer Products, 6469 Northam Drive, Mississauga, Ontario L4V 1J2, (416) 673-8060; in Vancouver (604) 872-0631 ● Xerox Canada, for nearest dealer call 1-800- ? ; in Toronto area (416) 229-3769

CN!

Atari ST Graphic Software



With one of its obvious fortes being graphics, paintbox programs would seem like an obvious application for the Atari ST. Here's a look at the most popular ones.

by Frank Lenk

There doesn't seem to be any obvious reason why all the 68000 based microcomputers on earth should be heavily oriented toward graphics... but that's the way things are working out. The Apple Macintosh set the trend, of course. Since then, any computer built around the same processor has felt obligated to provide *more* colour, *more* resolution and *more* pretty windows.

The Atari ST machine... thus far represented in both half and full megabyte versions... is not the most powerful of these graphics systems. It is, however, the most accessible. For just a little over a thousand dollars Canadian... roughly the price of a drab, stodgy old PC clone... you can have a machine with gobs of colour, good resolution and a fabulous RGB monitor capable of displaying it all in relative good taste.

Just to recap, the ST has three resolution modes. One of these is inaccessible unless you buy the separate monochrome monitor. This gives you six hundred and forty pixels across by four hundred down... roughly the sort of display you'd see on a PC with the Hercules display adapter. The higher resolution colour mode has the same resolution horizontally, two hundred pixels vertically, and can display four colours chosen from a palette of five hundred and twelve. The lowest resolution mode gives one three hundred and twenty pixels across and two hundred down, but can display sixteen colours at a time... chosen from that same palette.

All these pixels have little amusement value unless you also have software that can put them in their place... presumably some sort of artistic pattern. The ST has been remarkably slow to develop really good graphics software, but... at last... users now have a choice of several excellent packages. Here's a peek at some of the options.

NEOn Signs

The earliest bit of graphics software available for the ST was actually bundled with the machine. This is one reason that NEOchrome has emerged as a *de facto* graphics standard. The other main reason for the acceptance of "Neo" is that it is one of the most pleasantly usable systems ever designed.

The NEOchrome first issued with early STs was marked as prerelease version 0.5. Updates have appearing irregularly ever since. Something called version 0.9 is currently available on an "under the counter" basis. All versions of the program bear an Atari copyright notice, and the company had in fact promised to get a final version of the program packaged for market by last Christmas. At press time we still had no sign that this was going to materialize. However, getting by on version 0.9 is no hardship... and, by gosh, the price is right.

NEOchrome makes very shrewd decisions about several design points, resulting in an unusually attractive user interface. First of all... unlike its major competitors... the program boots up with a black screen background. This shows up the ST colours far more effectively than the glaring white "desktop".

Second, NEOchrome takes an unusual tack with its menu structure. The Neo screen is divided roughly in half. The top half is its painting areas, while the bottom half

displays its drawing tools. Separating the two halves is a row of sixteen coloured rectangles, representing its current colour palette. The rectangles at the far left represents the screen background colour. A little triangular pointer shows the current drawing colour. Colours can be edited in a separate box just below the palette line, either by resetting the numerical red, green and blue values or by pulling new hues off the full palette.

The lower middle of the screen is in fact occupied by this colour selection palette... a rectangular window that cleverly manages to display about half of the Atari's five hundred plus possible colours at once. This, of course, is impossible, since only sixteen colours are permissible on screen... but the programmers have evidently done some clever cheating to get around this limitation. The palette window can be scrolled sideways to access the full ST colour spectrum. A little white border can be moved using the cursor, putting any of the colours up into the colour edit box... from whence it may be transferred to any of the positions on your "working" palette bar.

The palette window has still more amazing tricks in store, since it actually serves double duty. When you move the mouse cursor up into the painting area, the window switches from palette display to magnified "fat bits" view. The cursor always appears as a white bordered square in the center of the little window. You thus get a constant blow up of what's happening in the cursor's immediate vicinity on the picture... a tremendous convenience for detailed work.

The standard drawing tools appear as icons on a rectangular grid at the lower left of the screen. All the usual stuff is there... pencil, paintbrush, lines, rectangles, circles, fill, airbrush, eraser and so forth. Cut and paste works either on rectangular areas or on arbitrary ones... selected using a little "jack knife" icon. The selection is remarkably complete, although two of the boxes on the menu are still blank in the current prerelease edition.

Most of the tool icons bring up a secondary menu at the lower right of the screen. For instance, the paintbrush offers a selection of forty brush types. The text function offers five font variations... plain, bold, italic, underlined and outlined... a choice of six point sizes, plus several more obscure options. The block cut and paste tool allows you to stretch blocks, rotate them, or flip them about any axis. The jackknife lets you select a piece of your picture and use it as a paintbrush.

There are also some nifty "hidden" features. For instance, initiating a line using the right instead of the left mouse button gives you a colour "ramp" line, shaded from one end to the other. Ramping colours are selected on the palette bar, using the right had mouse button. The same ramp can also be animated, so that screen areas using these colours will cycle through the selected range of shades. Some really spectacular effects can be achieved by using this rather simple trick.

Although you do most of your painting on the top half of the screen, this window can be scrolled to view a full screen image. Alternatively, the entire menu area can be hidden, either by hitting a "full screen" area on the icon menu or by toggling back and forth with the escape key.

At this point, NEOchrome functionality

still has a fairly low ceiling. Although you can get a co-ordinate display, there are no real scaling functions. The painting area is limited to a single screen, with no "virtual" workspace. There is no grid display to aid in rectilinear work. Its printer support is limited to what drivers you can score in the public domain. Worst of all, there is no pattern fill, and the selection of fonts is virtually non-existent. Nevertheless, NEOchrome is a powerful system. Its sweet personality alone should win it a place in every ST owner's heart.

Eat De Beans, Get De Gas

Batteries Included has always had a strong leaning toward the "home" computers... the Commodore 64, the early eight bit Ataris, the Apple II... but has eagerly moved ahead as these manufacturers themselves have upgraded. Degas was probably the first commercial paint program for the Atari ST. It was good, as far as it went, but then it didn't go all that much further than NEOchrome... and it certainly couldn't compete on the basis of price.

Degas Elite is one in a new line of "elite" products from Batteries Included. The new program goes light years beyond the regular old Degas. Although I personally find the NEOchrome interface strangely seductive, there's no question that Degas Elite is the ruling champion for ST power painting.

Like NEOchrome, Degas originally chose to eschew the complications of the GEM desktop. The home brew Degas interface is based on page flipping rather than screen splitting. Your colour and tool selections take up the whole screen when displayed, but can be hidden away... or recalled... at any time simply by hitting the right hand mouse button. This is an eminently convenient system.

The menu screen of Degas Elite has become crammed with options. A GEM style menu bar provides access to yet another level of commands... stashing away less used functions such as file operations, setup, pattern editing and block manipulations.

A band across the top of the menu screen allows the selection of working colours in much the same way as the palette bar in NEOchrome. Colours may be edited simply by double clicking any of the palette boxes. This brings up a large box with slider type controls for red, green and blue colour components. It also includes controls to allow previewing of your picture before finalizing the colour setting... a handy feature indeed. One of the file functions allows the colour palette to be loaded from any saved picture, although palettes cannot be saved alone.

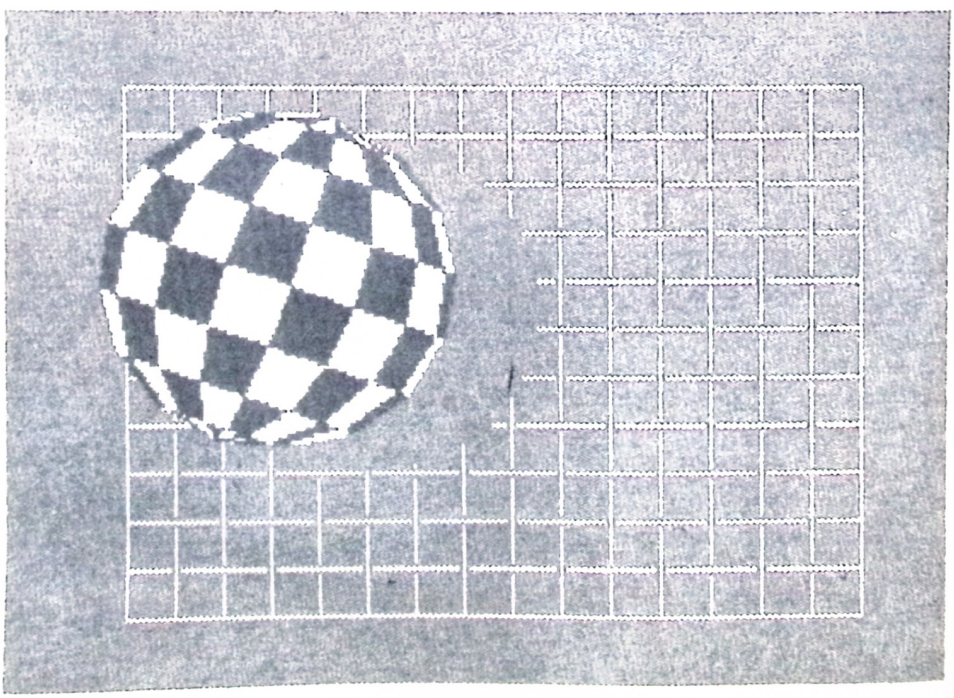
Sixteen brush shapes are shown immediately below the colour bar, and each brush can be edited in exactly the same way as the colour boxes. Just double click the brush to get a magnified edit view, which you can then hack up to your heart's content. Brush shapes can even be saved away for reuse.

Drawing tools are selected from text... rather than icon... boxes, grouped into several areas. The common tools such as line, eraser, circle and so on are in one area at the middle left. Below this is a box to select effects such as airbrushing, mirroring, or text. At the very bottom are two control options... slow draw, which slows the cursor to increase control, and snap, which emulates the CAD feature of the same name, restricting the cursor's movement to a rectilinear grid.

A separate control entitled "animation" provides the same colour cycling feature introduced by NEOchrome.

Three boxes at the middle right display your current text style, line style and fill pattern, in the current drawing colour. Arrows on either side of these style windows allow you to move backward or forward through the available choices. However, you can also double click on any of the windows to get a pop up menu showing all the choices.

The "fill" pop up also allows you to tog-



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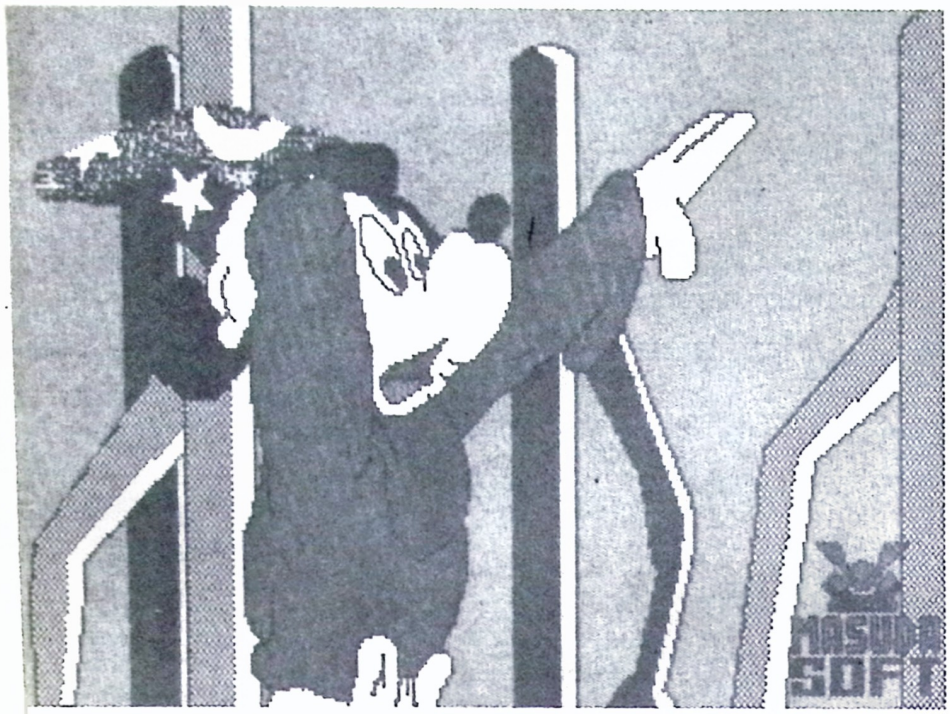


gle between monochromatic or multi-coloured patterns. The standard colour patterns include some truly mind bending designs, plus some more relaxed colour mixtures that can be used to effectively get around the Atari's sixteen colour display limitation.

Fill patterns are edited using the "make fill" option from the *make* pulldown menu. Once more, you get a magnified view of the pattern box, where you can perform pixel level editing of either colour or monochrome patterns. Line styles may be edited in the same way.

At the bottom right of the menu screen is evidence of one of the most powerful features of Degas Elite. A series of up to eight boxes... depending on your installed memory capacity... represents a series of multiple edit screens. Although Degas Elite is limited to a working page the size of your screen, it lets you edit up to eight of these screens at once on a 1040ST... the 520ST manages only two. You switch between screens simply by clicking on the number you want. Images can be copied from one screen to another using the block cut and paste functions. Alternatively, you can copy an entire screen over by using the conventional GEM "dragging" technique to move one menu box over to another. Pressing the *help* key while in the main menu screen pops up a box that lets you name each of your edit screens. When you choose to save your work, Degas Elite stashes the complete set of working screens.

There are some limitations to this multiple view capability. The image loaded into the number one screen determines the colour palette for all the other screens. Furthermore, there doesn't seem to be any overlay capability, which would allow you to do CAD type layered drawings. Still, the multiple screens are great fun to have around, and well worth upgrading your memory for.

The extra menu bar features of Degas Elite are strikingly comprehensive. The *set* menu lets you adjust the airbrush or set up any of a range of special effects... colour outlining, snap grid size, text effects and so forth.

The *file* menu may be the most amazing of all. Aside from just loading colour palettes or picture files, the menu also lets you toggle file compression on and off, or set up the file type to access. This latter feature allows Degas Elite to grab up files produced by NEOchrome, the eight bit Koala system... even IFF files produced on the Commodore Amiga.

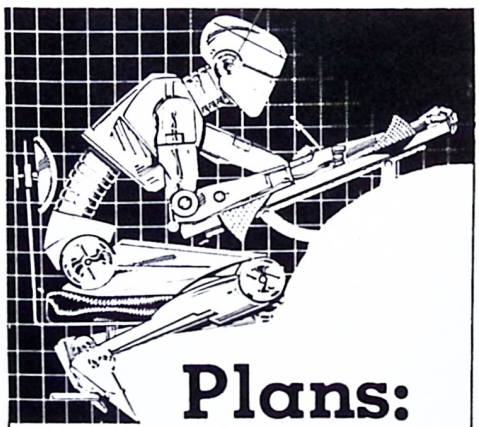
A less obvious strength of the Degas system is that it supports all three of the Atari display modes... low and medium resolution colour, plus high resolution monochrome. Degas Elite also features comprehensive printer support, ranging from Epson dot matrix to ink jet. About the only thing it *wouldn't* drive properly was my IBM compatible Epson HomeWriter. Ah well. Degas Elite is unquestionably one of the most flexible graphics systems you could hope to own. The price isn't bad, and I don't think any self respecting ST owner can really afford to do without Degas for long.

Take That, You CADD!

As we all know, there are some types of drawing that are not really suited to the pixel by pixel approach. For technical tasks we are better off to seek out a vector or object based system. Generic Software... makers of Generic CADD for the PC... have just introduced something called First CADD for the Atari ST.

First CADD is actually said to be a port of Generic CADD version 1.0... Generic CADD itself now being up to version 2.0. Nonetheless, First CADD is quite a complete drafting system, missing out only on the most advanced features such as auto dimensioning, available only as an add on for the PC version, in any case. First CADD is all the CAD most mortals really need.

First CADD is actually more "generic" than its parent program. The screen display on both the ST and PC versions is designed to mimic the popular AutoCAD interface... a square drawing area with a text menu vertically down the right and prompt lines appearing at the bottom. One selects drawing functions by pulling a highlighted bar down the menu and clicking the right hand mouse button. Alternatively... and very conveniently... First CADD accepts two letter keyboard commands. Once you get used to the system you can really make some speed



Plans:

Software:	**Degas, Degas Elite**
System:	**Atari ST**
Application:	**Painting**
Manufacturer:	**Batteries Included, 30 Mural Street, Richmond Hill, Ontario L4B 1B5, (416) 881-9941**
Price:	**$39.95 US (Degas), $79.95 US (Degas Elite)**
Software:	**NEOchrome**
System:	**Atari ST**
Application:	**Painting**
Manufacturer:	**Atari (Canada), 90 Gough Road, Markham, Ontario L3R 5V5, (416) 479-1266**
Available from:	**wherever you can get it**
Price:	**free, so far**
Software:	**First CADD**
System:	**Atari ST**
Application:	**Drafting, design**
Manufacturer:	**Generic Software**
Available from:	**Saraguay Software Distributors, 121 Avenue Road, 202, Toronto, Ontario M5R 2G3, (416) 924-7218**
Price:	**$74.95 (list)**

by ignoring the menus altogether.

Speed is where First CADD really pulls away from Generic CADD on the PC. The ST rendition runs so fast it's hard to believe... faster, I would say, than Generic CADD would run on a twelve megahertz AT with an 80287. Dot matrix printing... an optional extra with Generic CADD... is built into First CADD, and performs immensely faster than its Generic equivalent. However, despite a screen prompt that promised otherwise, First CADD failed to abort printing when I hit the escape key.

Naturally, First CADD also benefits from the ST colour capability. Although First CADD will run in the sixteen colour, low resolution mode, I found that the extra colours really weren't much use. The higher resolution, four colour mode gives about as much zip as a technical drawing really needs... enough, that is, to clearly separate text, dimension lines and perhaps a couple of drawing layers. Of course, First CADD will also work in the ST's monochrome mode, which would trade tremendous resolution for the inability to distinguish layers.

The drafting features in First CADD are remarkably complete. As intimated above, you can have layers if you want them... up to two hundred and fifty-six, in fact. All the stock drawing tools are available... points, lines, rectangles, polygons, ellipses, spline curves and so forth. Text can be added, although only a single font is supplied. Additional fonts can be constructed... since CADD fonts are treated simply as collections of drawing objects... but this is rather a labourious procedure.

Extra features include grid, snap, object libraries, co-ordinate display and such. The virtual page is relatively vast, and moving around it is no sweat, using a substantial repertoire of zoom and pan commands. The First CADD page is permanently dimensioned according to units you set, so your drawings can be scaled quite easily simply by making sure you're at the right level of zoom before you start.

I'm not sure how memory hungry the CADD page is, considering that objects are stored as mathematical abstractions, regardless of physical size. Booting up on 1040ST one is informed that about seven hundred and fifty thousand bytes are free for drawing data... which should be enough for most purposes. Drawings can be stored to disk either in their normal, compact form or as a complete text dump of the commands that created them.

It's not all that easy to find anything *wrong* with First CADD. Aside from dimensioning, the most obviously missing feature is fill... or "hatching", to use the jargon. This is usually found only in the *deluxe* systems... unfortunately, since most line drawings tend to look bleak and baffling without at least a little bit of filling in.

Although First CADD does offer rubber banding for lines, it is viciously absent when it comes to circles or polygons. However, the worst failing of the user interface is the absence of a directory display to assist one when using file functions. Loading objects or fonts, for instance, requires the user to have an excellent memory for filenames.

Of course, you'll probably want to dump the First CADD default menu structure as soon as possible. I found the menus to be rather badly organized... especially when compared to the much more rational layout of the PC version. However, First CADD does allow you to create your own menu files. Hacking the default file might be a good first step. The options themselves are fine... it's just that the program breaks things into pages in a rather awkward manner. This should be easily fixable.

The real limitations of First CADD appear only when one tries to push the program beyond its own prescribed limits. For instance, if you want to add lots of text, the shortage of fonts tends to hurt a bit. If all you want to do is whip up some quick designs, however, First CADD should be an excellent investment. **CN!**

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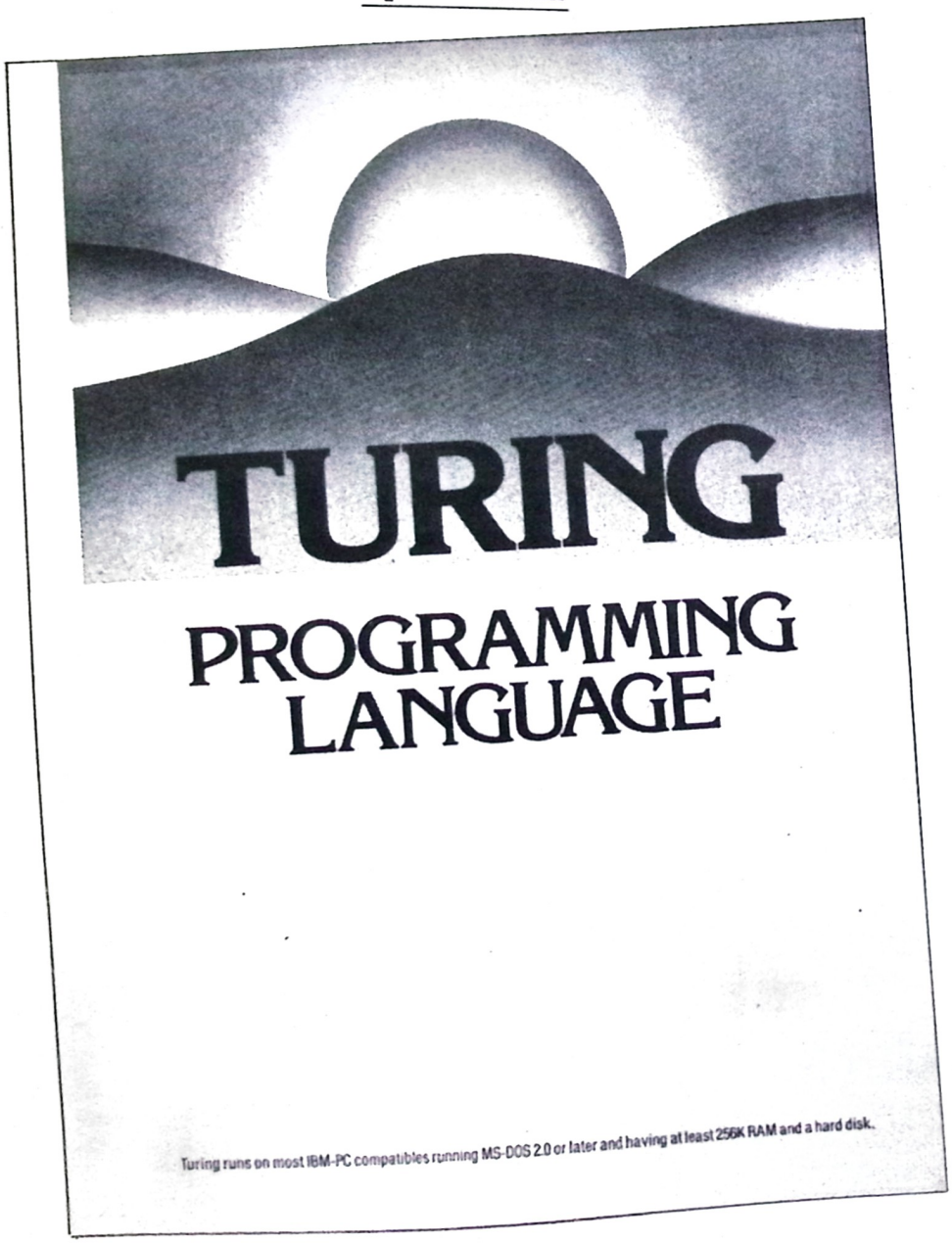
The Turing Review

There being so little interest in reviews of dead mathematicians, the article is actually about the language named after one.

by Frank Lenk


TURING
PROGRAMMING
LANGUAGE
Turing runs on most IBM-PC compatibles running MS-DOS 2.0 or later and having at least 256K RAM and a hard disk.

It often seems like everybody and their pet goldfish wants to write a compiler. Aspiring programmers are pummelled by advertising for language systems whose extravagant claims are rivalled only by their total obscurity. You know the sort of thing: "MegaUltraFlex's Turbo ALGOL compiler... ten times as fast as Turbo Pascal, better library support than Lattice C, fits on a single sided floppy disk."

A little bit of healthy skepticism is obviously called for. Fortunately, most mortals don't need more than one or two good, generic languages. As it happens, if you need something a little heavier than Turbo Pascal the Turing compiler may be just the ticket.

Of course, you may never have heard of a language called Turing. That's not so surprising, considering that it was been developed internally at the University of Toronto as a teaching tool, and has only recently achieved the distinction of commercial distribution. In spite of its academic origins, Turing turns out to be a very capable tool, for the right sort of task... and the right sort of programmer.

For Your Edification

Turing was created by the Computer Systems Research Institute at U. of T., written by professors R.C. Holt and James Cordy about four years ago. Since then, the language has been variously available for the IBM 370 mainframe, the DEC VAX and other heavyweight systems. The IBM PC implementation is relatively recent, and still evolving... although already quite capable of standing on its own.

Turing was apparently written largely in yet another custom University of Toronto language... Concurrent Euclid. Euclid seems to be the University's general purpose operating systems language, implemented on a wide range of hardware... both as a "native" system and for cross compiling. Just how Turing's Euclidean origins have affected its own nature is hard to say.

It is obvious, however, that Turing's academic roots *have* seriously affected the shape of the language. As a learning experience Turing really is a cut above most other language systems, for several reasons. First, as the University's handouts point out, the syntax is quite a bit more sensible than that of, say, Pascal. The absence of those irksome semicolons means one less thing for harried professors to explain, and one less thing for baffled students to worry about. Redundant verbiage such as "begin" is absent as well, although "end" still has its place.

The simplified syntax of Turing should make it a good vehicle for teaching the basic techniques of good programming. On the other hand, the extensive implementation of advanced structures in Turing should

allow students to keep growing with the system right up through the postgraduate levels. You can do a lot with Turing, if you really want to.

This is not to say that Turing is ideal in all ways and to all people. However, we'll deal more with the system's short comings a little further along.

As the educational intent of the language might imply, Turing is not at all difficult to learn... depending, of course, on your own taste in languages. A knowledge of Pascal will give you a definite boost as you launch off into the world of Turing... while a knowledge of, and god forbid, a liking for C will probably stop you cold. Turing is very similar in syntax to Pascal, and will seem similarly cumbersome and verbose to programmers more comfortable with the terse assemblages of punctuation marks that pass for source code in C.

Turing does "improve" on Pascal in several ways. First of all, there's the absence of semicolons. Semicolons are used in Pascal chiefly to make life easier for the compiler itself, and do very little to improve the quality of life for the programmer. Turing eschews all trace of semicolons.

Turing also has some original ideas about the standard command structures. Loops in particular are a bit unique, as the following snippet of code may demonstrate

```
var i,value : int := 1  % declare and initialize

loop
   put "*"..
   i := i + 1       % increment counter
   exit when i > 9      % the exit condition
end loop
```

This configuration, while at first glance a bit more convoluted than a "do while", does turn out to have its good points. For one thing, the exit condition and increment operation are both stated explicitly... making them more obvious to the student. The traditional word "do" is no great loss, since "loop" can certainly convey the same meaning all by itself.

The "put" statement on the third line above is the Turing equivalent of a "write" formatted output command. Once again, the choice of words is quite crafty. "Put" is short, to the point, and even manages to imply things about device independence. The trailing dots in this case prevent succeeding puts from starting on a new line, and the little program prints a row of asterisks. Much as in C, one could include parameters such as a backslash "n" in the string to produce a new line sequence on the screen.

The Turing "get"statement reverses the process, and provides formatted input.

Variable declarations in Turing are unremarkable, and work out about the same as in Pascal or C. The first line of the little example above is typical. You'll note that assignment is permitted, using the standard operator... a "colon equals" mark. Standard variable types include integer, real, boolean and string, plus the secondary types array, set, union, record, pointer, and so forth. You can forget about double precision. "If" you want to crunch numbers, "get" FORTRAN.

Probably the neatest advancement over other compiler systems is the inclusion of dynamic arrays. This means that you can assign the bounds of your array during execution of the program. Many compilers expect you to specify an array size at compile time, and insist on allocating array space of a fixed size. The following group of statements is legal in Turing but would buy you only a boot in the butt in other systems:

```
var n:int
get n       % get maximum size of array
var list:array 1..n of int
```

Comments in Turing are of two varieties. In line comments... as shown above... begin with a percent sign and terminate at the end of the current line. Larger blocks of text can be surrounded by the traditional "slash asterisk" markings, and may contain any number of lines.

Extra white space... blanks... within a program, is ignored by Turing, although identifiers... variable or procedure names... are case sensitive. Turing statements need not be on separate lines, so you can cram things together if you think that will make the logic easier to follow.

Structuring in Turing is particularly pleasant to use. As in Pascal or C, one has access to both procedure and function substructures. However, the "module" construct is added, allowing large programs to be broken down into independent chunks. Variables must be explicitly imported and exported for use in a module, isolating the module from the rest of your program. Modules can even be nested. This provides a structuring mechanism that is easy to use, yet far more powerful than anything in C or Pascal. Naturally, not everyone is going to need it. Still, Turing does seem to have some of the advantages of Modula for really large projects.

Recursion is permissible, as the following bit of code demonstrates:

```
include "%system"       % includes ""fetcharg()""
var i : int

function Factorial(i:int):int
    var fact:int := i
    if i = 1 then
        fact := 1       % the boundary condition
    else
        fact := fact * Factorial(i - 1)
    end if
    result fact  % return this value
end Factorial

put Factorial(strint(fetcharg(1)))
```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Another place Turing really shines is on error checking. The compilation process consists of five separate phases, listed on the screen as they proceed.

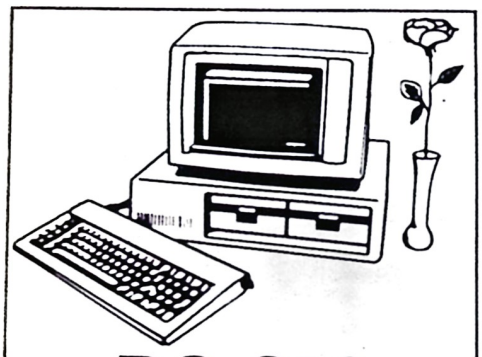
```
phase 1: scanner/parser
phase 2: semantic analysis
phase 3: storage allocation
phase 4: code generation
phase 5: linkage
```

Phase five simply runs the stock Microsoft Link program, with a rather dazzling display of parameters. These can be reset, by the way, using Turing's command line options.

If you've got problems in your source code, phase two is where you'll hear about it. Its error messages are verbose and amazingly informative. For instance, I got things like

```
Line 9 of ftestl.t: String passed to strint is
      not in correct format.
```

Not only was this an accurate description of my problem, it identified the line number in my source code. Using an editor such as PC-Write... or Turing's own TTV editor... it's easy to flash down to the specified line number and fix things up.



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"Strint", in case you're wondering, is one of Turing's handy built in functions, and converts a numerical string to its equivalent integer value.

Surprisingly, Turing's run time messages are just as good. For instance, an early version of my factorial program... lacking the *if..then..else* boundary checking... compiled without a hitch, but produced the following dissertation when executed:

```
Line 7 of fact.t: Subprogram calls
      nested too deeply.
      (Probable cause: infinite recursion).
```

Poking around in the guts of my *exe* file, I located something over a kilobyte of text messages. Sure enough, using the compiler option to disable run time checking shaves about that much off your *exe* file.

The TTV editor supplied with Turing is more than a little bizarre. For instance, try to explain why the F2 key should mean "word back" while the F3 key means "word forward". TTV does allow you to compile programs directly from the edit screen. However, I found that files which compiled and ran perfectly from the command line produced all manner of error messages in TTV. I think this thing needs a bit more work, and I would recommend that prospective Turing programmers bring their own editing equipment.

The IBM system support in Turing is presently a bit sketchy. There are several include files provided, such as *curses, limits, system, music* and *grafix*. The limits file makes language limits available within your program, so you can trap for values that might otherwise spill over. The *curses* file provides a mess of text screen functions that allow you to put characters where you want them, change colour attributes and so forth.

The system file provides several highly useful functions, including the ability to fetch command line arguments, DOS environment strings, the time and the date. Unfortunately, the available functions only scratch the surface of what's really required to tie into the operating system. If only there were some way of directly accessing DOS interrupts from Turing. One could presumably create an interrupt and link it in, but this is a considerable annoyance.

The *grafix* file is not all that exciting, providing only a few simple block oriented commands.

Turing Circus

In terms of brute force performance, Turing exhibits both good and bad features.

On the debit side there's program size. As befits a language that started life on mainframes, Turing is far from tight as far as the size of the programs it generates. A "null" program... in Turing, just a comment... compiles to an *exe* file of about fifteen kilobytes. This compares not unfavourably with Turbo Pascal, which has an overhead of ten or eleven kilobytes. However, it is left behind by the many C compilers that can pop out little programs of three or four kilobytes at a time.

Furthermore, most compilers provide at least the option of going to COM files, which cuts the DOS overheads when running tiny little utilities. Running EXE2BIN on a Turing program is a futile endeavour, and results only in a "cannot be converted" message. There does not seem to be any compiler option to circumvent this. Some people will miss COM files more than others. If you're designing a word processor, I doubt if you'll care.

As far as execution speed, Turing gives very little away. None of the small sample programs I wrote took any appreciable time to execute. In most cases it was obviously taking longer to write the result to the screen than to formulate it. The large file size works more to the disadvantage of trivial programs than does the actual compiler coding. The time taken to load a seventeen kilobyte Turing file can dwarf the time it takes to execute it.

Compile speed is another thing entirely. A trivial Turing file takes about forty-five seconds to compile and link... compared to about five seconds for a similar file in Datalight C, or about no seconds in Turbo Pascal. Some of the demonstration programs ran to about fifteen kilobytes of source code, and these typically took on the order of five minutes to compile. These times are all based on the use of a hard disk.

The latter appurtenance is far from optional. You should realize that Turing is what you might call "a big mother", and *insists* on running from a hard disk. Unless you've got some sort of extended memory in your PC you can forget about getting all of its associated *exe* files and libraries into a RAM disk.

The documentation in the Turing package is decent, if not exactly voluminous. The manual... entitled "The Turing Language Report"... does little more than to specify the language's syntax, in boring detail. A stack of stapled sheets describes the include files and the editor and provides technical specifications... such as variable types and memory usage. The technical information isn't bad, actually, and even includes examples in C and assembler of how to interface object modules into your Turing programs.

If you're serious about Turing you should seriously consider the official textbook... "Introduction to Computer Science using the Turing Programming Language". Co-written by one of Turing's creators, this

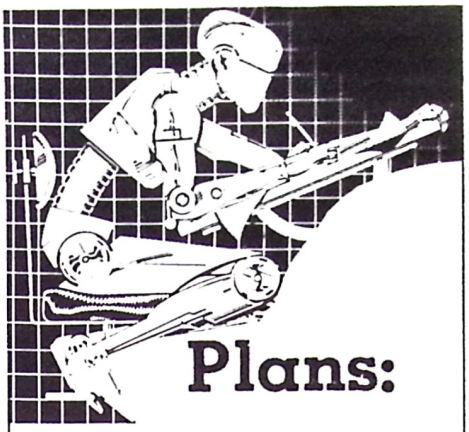
book is rather well put together, being both easy to read and informative. As befits its title, this text is capable of teaching complete novices most everything there is to know about programming in your typical structured language. The only thing you'd need to add is some good background on the PC itself.

Turing Or Not Turing

As a commercial product, Turing probably has a fairly narrow audience. Part of that audience is guaranteed... being made up of students who are going to *have* to know Turing in order to graduate.

If you're just a private individual who'd like to learn structured programming as painlessly as possible, Turing is still not a bad choice. The language does very little to get in one's way, and has enough meat on it to satisfy the more power hungry programmer as well. The only catch is you have to have a hard disk.

As a real development system for the PC, Turing still falls somewhat short. However, an extended version of Turing... called Turing Plus... is presently under development at the University. Additions are expected to include "concurrency, exception handling, separate compilation of modules and subprograms, type cheats and low level escapes for system programming." The latter would be particularly welcome, and could make Turing truly competitive as a development language. **CN!**



Plans:

Software:	**PC Turing**
System:	**IBM PC**
Application:	**Programming Language**
Manufacturer:	**Computer Systems Research Institute, University of Toronto**
Availability:	**Holt Software Associates Inc., 203 College Street, Suite 305, Toronto, Ontario M5T 1P9, (416) 978-6985**
Price:	**$89.00**

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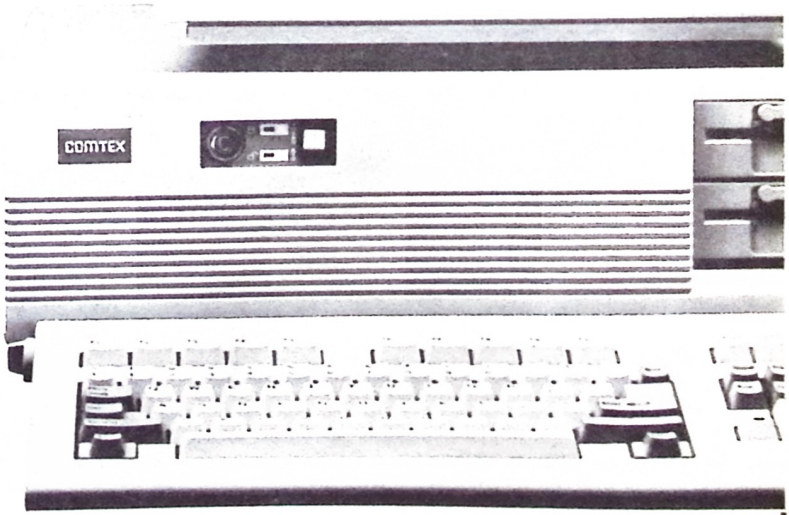

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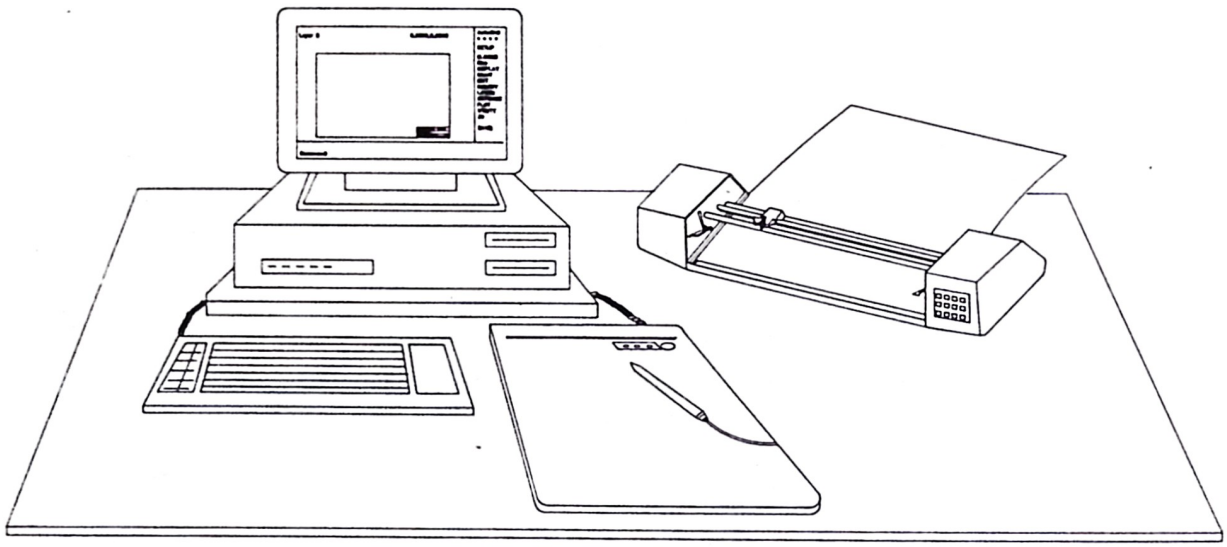
A Peek Inside AutoCAD

While the AutoCAD documentation is comprehensive, it doesn't really tell you how to use this impressive package. These third party manuals are probably the last word in CAD manuals.

by Frank Lenk



In the field of computer aided drafting, there are now many fine products competing for a designer's affections. However, the name AutoCAD will forever remain synonymous with microcomputer graphic design... much the way Kleenex has become another word for tissue paper, only with maybe a bit more dignity.

Classic software is not necessarily simple software. In fact, at first sight, it is almost certain to be totally baffling. Nobody said being ahead of your time was going to be easy.

AutoCAD, like any decent piece of software, arrives with a wad of documentation. However, there's a big difference between documenting and teaching. The complete realm of CAD is a subject for lifelong study, and not something to be shoehorned into the margins of a manual already heavily burdened by its primary task of simply itemizing the features of a particular piece of software.

Which brings us to the lesson for today. A California company has stepped into the breach with a series of CAD textbooks. These books attempt to provide a painless, step by step introduction to AutoCAD. If you're into CAD at all, these volumes are well worth checking out.

Inside Out

The keystone of the New Riders series is *Inside AutoCAD*, by D. Raker and H. Rice. Like the companion volumes, this tome sits about eight and a half by eleven inches across, and about three quarters of an inch thick. It's clearly laid out and well bound... paperbacked but taking the classy approach of being sewn in signatures. The book assumes that you know nothing more about CAD than which end of a floppy to stick in the drive, and which side of the keyboard to hit with your fingers.

This approach has its drawbacks. Try as I might, I can't quite envision a complete numbskull attempting to learn CAD. Therefore I can't really see the point in starting out a textbook as though speaking to just such a total nimrod. Still, as abcderian writing goes, Inside AutoCAD manages to be fairly bright and pleasant about it. Besides, this is only the beginning.

Inside AutoCAD is divided into twelve chapters and several appendices. Here's the layout.

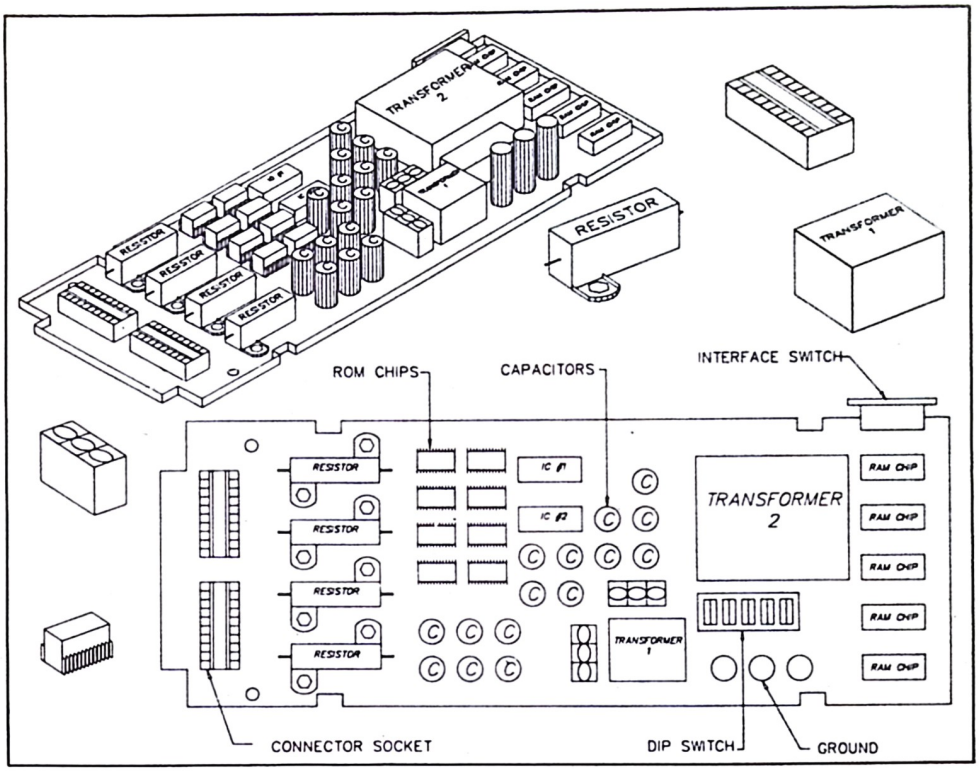
1. **Setting Up AutoCAD**
2. **Getting Around**
3. **Graphics Primitives**
4. **Introduction to Editing**
5. **Drawing Construction Techniques**
6. **Herding Objects into Symbols**
7. **Drawing Enhancements**
8. **Drawing Output**
9. **3-D – Making Your Drawings Stand Out**
10. **Drawing Intelligence**
11. **Attributes and Data Extraction**
12. **Customizing**

The appendices include a full page tree diagram of the AutoCAD 2.5 menu structure, a few pages on setting up a plotter and a few hints on using a graphics tablet. Naturally there's an index at the back.

Inside AutoCAD is strictly *hands on* stuff. Each chapter moves you through a logical progression of tasks, and assumes that you're sitting in front of your PC, trying things out. Even so, it is possible to read the book with your feet up, far from any electronic accoutrements. Virtually all AutoCAD prompts and displays are faithfully reproduced at the appropriate points in the text.

The book is quite profusely illustrated,

A Peek Inside AutoCAD



in an unspectacular but highly functional style that supports the hands on approach rather well. The left hand margin of each page contains as many small line drawings as it takes to get the point across. These drawings include actual graphic output, text menus and simplified representations of what you'll be seeing on your screen as you work your way through the examples in the text.

For example, let's take chapter two... getting around. The book starts by simply listing a bunch of commands that you'll be using to move about your work surface. These include "crosshair control commands" such as snap, osnap, ortho and grid, plus "display commands" such as zoom, pan, regen and redraw. This list is purely for orientation purposes, as the next section starts right at the beginning, talking about how to figure out where your cursor is on the drawing page by reading the coordinate display.

Next, you find out about the snap, grid and pick commands. "No these aren't the noisy fellows on the Rice Krispies package!" says the book... which gives you an idea of the sort of sidesplitting levity that's interspersed throughout. The next nine pages deal in great depth with the correct methods for setting up these three locating options.

Finally you come to display control... zoom. Seven pages of that, then a surprisingly brief mention of panning, and finally a bit about regen and redraw.

Each chapter ends with a short "checklist", summarizing the key points it has covered, and acting as a road map for future use.

Deeper Into The Unknown

All of this should be excellent training for those starting completely cold, with no knowledge at all of computer screens, cursors, grids, coordinates, rubber banding and all the other graphics lexicon. Inside AutoCAD is designed to best serve those who don't know what questions to ask.

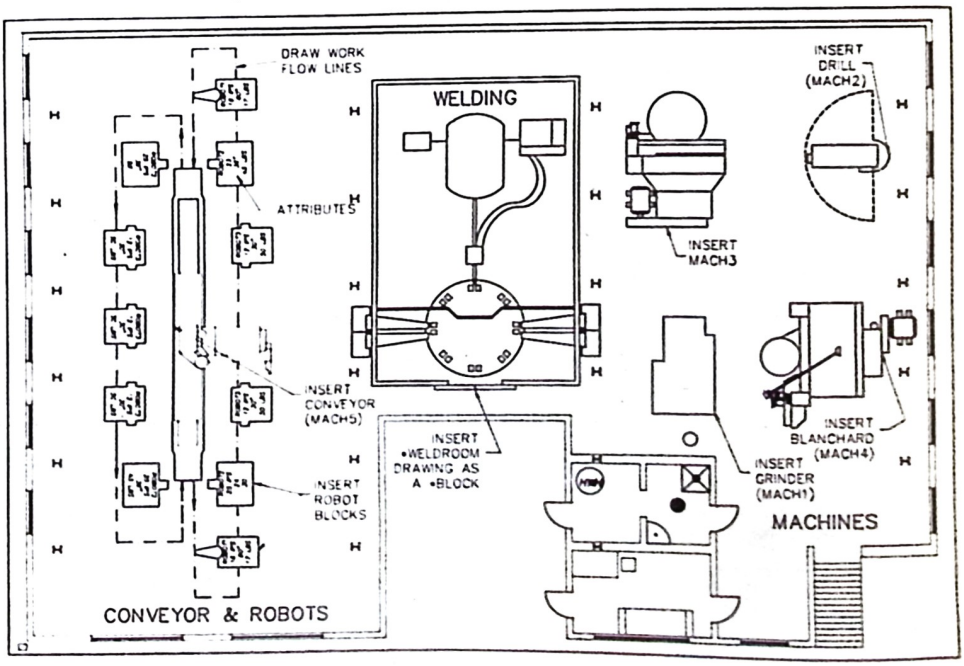
For the partially experienced student who merely wishes to pick up on the finer points, Inside AutoCAD can occasionally seem a bit cute and condescending. Even so, it will never fail to be informative. For instance, you may not need to be told that "a solid is a polygon filled with ink"... but at least you will be able to find out, in detail, how to create one. See page two hundred and five... or look under "solid" in the index.

The book presses on from the simple stuff right through dimensioning and on into the use of attributes and related techniques in managing your drawing data. The last chapter gets into custom menus, scripts, macros and even gives a brief treatise on the use of the AutoLISP programming language.

If you want to push on still further into the advanced capabilities available with AutoCAD, New Riders has just the thing... a companion tome entitled *Working Out With AutoCAD*, by Martha Lubow. Where Inside AutoCAD is function oriented, Working Out is task oriented... based on a series of exercises, each of which aims to accomplish a specific type of drawing task. There are seven "Exercise Sets".

1. **MS-DOS and the AutoCAD Drawing Environment**
2. **Designing Electronic Sheets**
3. **Building Up a Drawing Through Editing**
4. **Creating Drawings with Symbols**
5. **Assembling Complex Drawings**
6. **Plotting Drawings and Symbol Sheets**
7. **Customizing AutoCAD**

The practice drawings and text files described in the text can be created by following through the exercises, or purchased com-

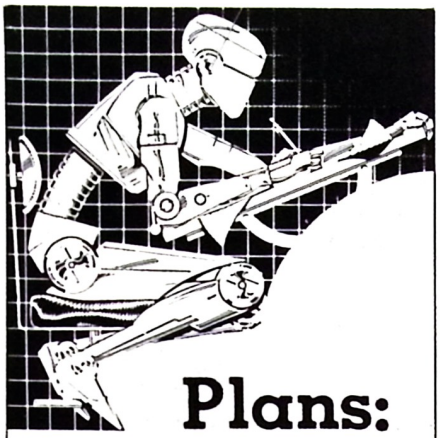


plete on the companion disk... available for just under fifteen dollars American.

Set one is subdivided into three actual exercises. The first two go right back to the very beginning, with weighty topics like "what is a file", "what is a directory", and the proper use of DOS commands such as copy and delete. The AutoCAD interface is described, including important details such as how to read the coordinate display, or how to pick items off the menu. Finally in the third exercise the student actually gets to create a simple design... a robotic wrist joint, no less. This consists of a circle and a few lines plus some dimensioning. The book steps you through the whole procedure, covering most of what you need to know in order to generate any simple mechanical drawing.

Succeeding exercise sets bring in other AutoCAD features, a bit at a time. Symbol sheets come up in set four. Set five gets heavily into extracting reports in standard data format, based on a complex plant floor plan.

Overall, Working Out looks like a much more widely useful treatise, since is should have a good deal to say to the widest spectrum of AutoCAD users... starting with those who've barely learned how to boot the program, but with lots of punch left for the expert who still has a few specific questions unanswered. For instance, exercise set seven runs through programming samples,



Plans:

Titles:	**Inside AutoCAD, Working Out With AutoCAD**
System:	**IBM PC**
Application:	**CAD Tutorial**
Publisherer:	**New Riders Publishing, P.O. Box 4846, Thousand Oaks, California 91360**
Price:	**$34.95 US (Inside AutoCAD); $29.95 US (Working Out With AutoCAD)**

such as creating macro "scripts" to automate common operations, or to create slide show presentations. These are complex bits of coding... just the sort of thing that one might want refreshing in from time to time.

New Riders has yet another trick up its sleeve. This is the two volume set, *Stepping Into CAD*, by Mark Merickel. One is tempted to assume this will be followed by the companion piece, "Getting CAD Off Your Shoes". The Stepping Into CAD books are one more try at teaching CAD. In this case you get an exercise book and matching teacher's guide. The exercises follow somewhat the same format as those in Working Out, although the emphasis seems to be restricted more to the basics of drawing. Stepping Into CAD is obviously geared to a classroom environment, and the individual user would probably choose Working Out as a more appropriate guide.

Whatever your level of knowledge when you start into AutoCAD, one of these books should probably be included in the purchase price of the AutoCAD system. "Third party" documentation is only going to be available for the established classics... like AutoCAD... but then that's one of the better reasons for buying big name software in the first place. **CN!**

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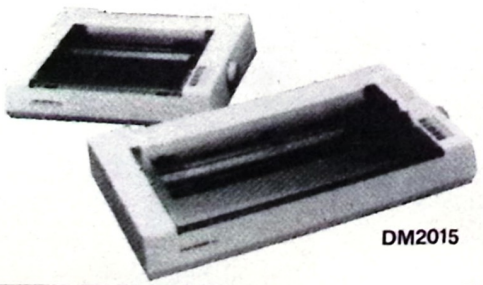

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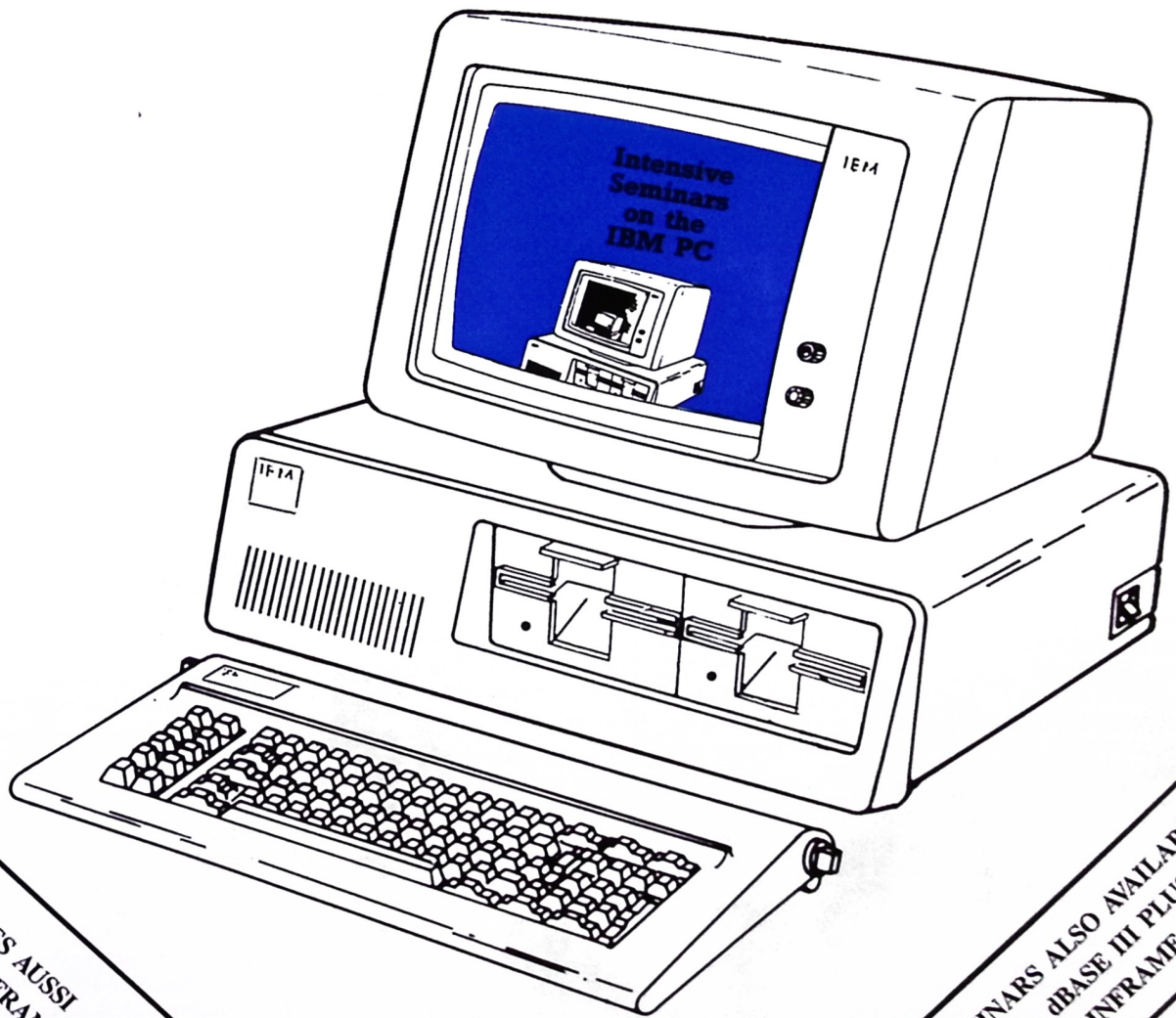

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A guide for Selection and Use of Personal Computer Desktop Publishing Systems

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Many organizations have been using mainframe and minicomputer based electronic systems to reduce publishing costs and speed up communications. Recent hardware and software innovations are now enabling electronic publishing to be performed on low cost personal computers. The desktop publishing systems introduced for the Apple Macintosh are now available for use on the IBM Personal Computer and IBM compatibles. Both the Macintosh and PC based systems can handle design and layout and produce top quality printed materials as well. This means that existing personal computers can be turned into sophisticated, cost effective publishing systems.

There is no longer a need to cut and paste or send catalogues, publications and manuals to outside production houses. Desktop publishing technologies will let you produce documents much faster than with conventional methods while maintaining quality that rivals outside print shops. These systems enable rapid integration of text, data and graphic entities with documents created from scanned images and text as well as from standard spreadsheet, database and graphics programs.

Why You Should Attend

This intensive three day seminar will rapidly bring you up to speed on everything that you have to know to select and use a desktop publishing system effectively.

A Complete Desktop Publishing Seminar

The class begins with a presentation of personal computer and publishing technology and concepts. This includes computer architecture, hardware and software limitations, as they apply to document creation. Publishing concepts including graphics and text creation, font selection and page design, are presented from the desktop publishing perspective.

The details of available hardware and software systems and the types of applications for which each are most suited are presented. The use of both PC and mini computer based systems are discussed.

The seminar presents a detailed description of all the components required to configure a desktop publishing system. The components are then related to the various stages of document creation. The critical decision involves selecting the appropriate technology for a given job. A poor selection can be frustrating and expensive.

You will learn how to choose and use the appropriate word processor for text creation and editing, all about drawing painting programs, and digitizers, for image creation and manipulation, and page makeup programs for layout. It is imperative that these system components not only work well together, but are used with the appropriate hardware and are able to integrate existing mainframe and PC based text, data and graphics.

A page-design or layout language is the key to integrating document elements into a final form. A comparative analysis of the key page make-up systems with their inherent advantages and limitations will enable attendees to select this critical component.

Once a document is created the output devices or print device must be matched to the job; this means using low-cost, draft quality dot matrix printers, near typeset quality laser printers and phototypesetting equipment. There are presently three standards competing for control of these output devices, Apple supported PostScript, Hewlett Packard supported DDL and Xerox's Interpress. The relative merits of each of these systems is described and the circumstances under which each should be used. The pros and cons of using non-standard output devices are also discussed.

Hardware components described include not only computers and printers but image digitizers, page readers and optical character readers. The seminar methodically guides you through this selection process while emphasizing integrated operation and useability.

You Will Learn About

Where to use Desktop Publishing Techniques.
Where are the Real Costs and Benefits?
Computer Publishing Terminology and Concepts
Using PC and Mainframe Data
When to use a Mini rather than a PC
Design Concepts
Aesthetics of Page Layout
Macintosh vs IBM-PC Based Systems
Desktop Environments
Page Reader Products
Using Word Processing Documents
Selecting a Page Makeup Program
High Resolution and Full Page Displays
The Pros and Cons of Laser Printers
Options for Final Production
Raster vs Vector Drawing
Interfacing to Typesetting Equipment
Establishing Hardware Configurations
Networks and Data Communications

Who Should Attend

This class has been designed for PC users, managers, data processing staff, publishers and designers who wish to harness the power of a low cost personal computer for the creation of professional level reports, manuals, brochures and documents. No prior knowledge of computers or publishing is required.

Valuable Workbook

All attendees will receive a detailed desktop publishing reference workbook to aid in the selection and use of their desk top publishing systems.

Course Director

J. Scott Walton has worked in the computer and publishing industries for 20 years and was responsible for designing one of the first computerized publishing systems. He is internationally known as a seminar and lecture leader on personal computers, networking and electronic publishing. As a PC seminar leader and trainer, he works with desktop publishing applications, personal computer implementation, software use and installation, communications and networking. Mr. Walton has a rare combination of publishing experience, computer background, and superb teaching ability.

Locations and Dates of Seminars

Edmonton: Château Lacombe
November 30 - December 2

Toronto: Venture Inn
May 20-22
October 21-23

Hull: Hôtel Plaza de la Chaudière
June 17-19
November 18-20

Vancouver:
Westin Bayshore
October 28-30

Calgary: Delta Bow Valley
November 2-4

Toronto: Sheraton Centre
September 9-11

Montreal: Grand Hôtel
July 15-17
September 28-30

Halifax:
Château Halifax
November 23-25

Course Outline

1. Background and Terminology
What is Desktop Publishing?
The Evolution
A Merging of Technologies
What is Really Needed

2. Publishing Background
The Team —
  Graphic Designer, Illustrator, Writer, Proofreader
Basic Concepts and Terminology
  Typefaces, Fonts, Styles, and Sizes
  Leading, Spacing, Letter Spacing
  Carding and Kerning
Typesetting vs Page Composition
Principles of Layout and Design
  Use of Whitespace
  Grouping of Subject Matter
  Consistency of Design
  Design as an Element of Communication
Graphic Images
  Integrating the Images
  Producing the Image
  Reproduction Considerations

3. Computer Background
Architectural Distinctions
Processors 80286, 80386 vs 68000
Backup Processing
Graphic Displays
When to Use a Mini
Operating Systems DOS, UNIX, the MAC
The MAC vs. the PC
Environments, GEM, Windows, The MAC

4. Technological Limitations
Speed and Resolution
High Resolution Screens: Wyse, Genius, etc.
The Emerging Standards
System Selection Criteria

5. The Four Steps to Document Creation
Input: Text and Graphics
Line Makeup: Processing the Text
  - Typeface Selection
Page Makeup: Text and Graphic Integration into Pages
Output: Laser Printers, Phototypesetters

6. Document Type and System Requirements
Complex Graphic Requirements
Application: Commercial vs In-house
Budget Requirements
Hardware Software Selection Criteria

7. Document Creation
Up Front Planning
Planning the Format
Roughing the Layout
Text and Graphic Input
Page Makeup
Draft and Review
Editing
Final Output Production

8. The Input Stage
Computer Data: LOTUS 123, dBASE, etc.
Data and Media Conversion
Standard Formats: DCA, DOC, ASCII, etc.
Text Based Editors: Embedded Code
Integrated Word Processors:
  Windows, WordPerfect, Displaywrite, etc.
Painting Packages: MAC Paint, PC Paint, etc.
Drawing Packages: AUTOCAD, GEM DRAW, etc.
Page Readers: DEST, Cannon, Microtex
  Resolution, Speed
  Handling Grey Scale and Colour
  Integration with Graphics Packages

9. Line Make Up
Batch Systems: TROFF, NROFF, Script, TEX
Embedded Code
What You See Is What You Get (WYSIWYG)
Font Selection
Flowing Text, Hyphenation, Pagination

10. Page Makeup
Visual Make Up:
  Pagemaker, Ventura, Superpage, etc.
Designing a Layout Grid
Incorporating Graphics and Data
  - Cropping and Scaling
Page Definitions:
  Margins, Multiple Columns and Spacing
  Moving and Rearranging Pages
  Last Minute Editing and Text Entry
  Effect of Page Rearrangement on Line Breaks
  Editing for Page Appearance
Command Based:
  Spellbinder, Laserscript, etc.
  When to Use

11. The Final Document
Table of Contents, Indexes
Special Touches
What to Avoid

12. The Output Stage
Printer Options
Downloadable Fonts
Printer Languages – PostScript, Interpress, DDL
Printer Selection: Apple Laser, Laser Jet, etc.
Output to Phototypesetters: Compugraphics,
  Merganthaller, etc.
Colour

13. The Loose Ends
Selecting Turnkey Systems
  Apple, Hewlett Packard, Xerox
  What About IBM?
Printer Speed
The Use of Networks

14. The Future
Input Devices
Display Systems
Printers
Better Integrated Products

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Hundreds of IBM Personal Computers have been brought into our organizations on the assumption that they will increase productivity. Unfortunately, the realities of personal computing do not match most users' expectations. The PC is not easy to learn and use! PC software often does not match its advertised claims and poor documentation makes programs difficult, if not impossible, to learn. The question of data validity and integrity is not being addressed by either software vendors or our organizations. As a result, major errors are appearing in the output of critical database and spreadsheet applications. On top of this, the proliferation of software products and add-on utilities continues to overwhelm the user who can't spend hours of valuable work time reading trade journals and experimenting with new packages. Staying current is a major task, and this seminar has been designed to help you make sense of what's going on.

Why You Should Attend

This intensive two-day class is designed for users and managers who wish to make better use of their PCs. The course starts from an application software perspective, covering standard applications and the necessary add-on products that make them really function, as well as tricks and techniques for handling the disc operating system (DOS). All the details of hardware components critical to configuring systems and improving performance are presented. PC-to-PC and PC-to-mainframe communications for data transfer and sharing are introduced from a realworld perspective, along with the details of selecting and using local area networks. This class emphasizes not only the technical aspects of configuring, installing and using PCs, but managerial and operational issues as well. The class concludes with a presentation and analysis of working PC policy documents to establish practical guidelines and a PC support structure for your organization. A Request for Proposal to assure 100% IBM compatibility in purchasing a "clone" is part of the workbook.

The instructors have many hours of experience with a multitude of software products and hardware configurations. They present practical solutions to configuration, installation, data communications and networking problems. To assist you in streamlining the operation of your PC, you will receive a diskette containing vital utility and productivity improvement programs. This class is full of information that will save you hours of unnecessary frustration with your computer.

Who Should Attend

- Managers who need to use and support Personal Computers
- Information Center staff who provide user support and training
- Users feeling overwhelmed by their Personal Computers
- Data Processing Personnel attempting to integrate PCs into their organizational computing structure

This course has valuable information for users with all levels of background.

What You Will Learn

- Which PC Applications Work and Which Ones Don't
- How to Configure your Machine for Maximum Versatility
- Overcoming the Deficiencies of DOS
- How to Verify the Correctness of PC Output
- Backup and Archiving Procedures
- Training For Maximum Productivity
- Hardware Configurations and When Not to Choose IBM
- Peripheral and Data Sharing Issues
- Protection Against Hardware Failure
- Data Communications to Other PCs and Mainframes
- How Good Are Laser Printers
- LAN Installation and Use Issues
- Creative Use of Batch Files
- Shielding the User From the Operating System
- Support Requirements for Personal Computer Users
- Establishing a Workable PC Policy

Workbook & Software

All attendees will receive a comprehensive workbook as well as detailed policy and RFP documents and a floppy disc containing vital software.

Course Directors

Over 8,000 people have attended seminars on the PC by the team preparing and presenting this series.

Key personnel include:
Dr. Fred Stern who has 25 years experience with computers. He is the author of **Word Processing and Beyond,** and of **Organizational Implementation of the IBM PC,** and is editor of James Martin's forthcoming **Report on PC Software.** PC Magazine says "With an energetic instructor like Stern, the hours pass quickly as the class covers vast amounts of material... When Stern tosses out the phrase 'the bottom line', participants become more alert... He will be delivering another time or money saving tip."

Neil McCubbin is an engineer with over 15 years of practical computer background. He has worked with major organizations on PC implementation. He has presented numerous PC seminars in both French and English, has published many papers and writes monthly columns on microcomputers in two professional magazines.

Gary Mikronis was active in microcomputer development in the mid-1970's, and is now an applications consultant and one of the Centre's leading instructors. He was formerly Director of Information Processing in a government department where he converted a number of applications from mainframes to micros.

He has presented PC seminars in several countries, including Canada, the US, Singapore, and the UK.

Locations and Dates of Seminars

Edmonton: Château Lacombe
November 16-17

Toronto: Venture Inn
June 1-2
October 5-6

Hull: Hôtel Plaza de la Chaudière
June 8-9
November 2-3

Vancouver:
Westin Bayshore
Nov. 30 - Dec. 1

Calgary: Delta Bow Valley
September 28-29

Toronto: Sheraton Centre
November 16-17

Montreal: Grand Hôtel
July 6-7
October 19-20

Halifax:
Château Halifax
December 7-8

Course Outline

1. Introduction
The IBM PC Family of Products
PC Architecture
Organizational Role of the PC
IBM Product Limitations

2. Software: The Technical Perspective
Software Overview
The Vital Packages
- Spreadsheets
  - 123 vs. the Others
  - Applications Made for the Spreadsheet
  - Should You Use a Data Base?
- Data Base Management
  - List and File Managers vs. DBMs
  - Multiuser Database Applications
- Word Processing
  - Which of the 468 Products?
- Integrated Packages
  - Do You Need Symphony?
- Graphics
  - Data Graphing, Drawing, Presentation
  - Business Graphics, CAD
- The Vital Utilities
  - Sidekick, Norton, Prokey, etc.
- Critical Path Scheduling and Others

3. The Role of the Operating System
Practical Use of DOS
Building an Effective Hierarchical File Structure
Automating Operation with Batch Files
Redirecting I/O and Device Drivers
Pipes and Filters
Shielding the User From DOS

4. Software: The Critical Questions
Selecting Standard Packages
Training: Breaking the Learning Curve
Required Support for the User
Documenting Software Use
Application Development
Licence Issues
Solving Data Incompatibilities
- — Between PC Packages
- — To Minis and Mainframes

Auditing, Verification, and Validation Procedures
Backup and Archiving Techniques

5. The PC XT/AT Hardware: A Technical View
The System Units
Processors 8088, 8086, 80286, 80386
Co-processors 8087, 80287, 80387
Display and Adapter Boards
Multifunction Boards and Memory beyond 640K
Floppy and Hard Disc Drives
Printers, Other Peripherals, etc.
Configuring a System for Software
What is IBM Planning Next?

6. The PC XT/AT Hardware: The Real Issues
Hardware Standardization
Installation and Checkout
The Clones
Performance Improvements
Significance of the 80386 Machines
Purchasing Guidelines
The Maintenance Issue
Hardware Log Books

7. Data Communications and Networking: The Technical Perspective
Data Communications Background
PC to PC Communications
The PC-Mainframe Link
The AT as a Multiuser System
The IBM PC Network and Token Ring Network
- Hardware Components and Restrictions
- Managing Networks
- Configuring and Using the Network

The PC LAN as a Mainframe Gateway
Introducing LU6.2
Other LAN Vendors and Products

8. Data Communications and Networking: Making It Work
Standardizing Hardware and Software
Access and Security Issues
Mainframe Uploading and Downloading
Reducing and Controlling Line Costs
Cabling and Installation Requirements
Managing File, Print and Communication Servers
- Backup Procedures, Restarting the Network
- Handling Bottlenecks, File Naming Conventions

9. The PC XT/AT Organizational Policy Document
The Politics of Policy
What Must be Addressed?
Presentation and Evaluation of Working Documents
Defining the Infocentre Role
The Role of the DP Department
Where do We Go from Here?

Data Communications for the IBM PC

All of the Answers to PC to PC and PC to Mainframe Data Communications in one day.

Edmonton: Château Lacombe
November 18

Toronto: Venture Inn
June 3
October 7

Hull: Hôtel Plaza de la Chaudière
June 10
November 4

Vancouver:
Westin Bayshore
December 2

Calgary: Delta Bow Valley
September 30

Toronto: Sheraton Centre
November 18

Montreal: Grand Hôtel
July 8
October 21

Halifax:
Château Halifax
December 9

Fee $495 Less Discounts on Back Page

Why You Should Attend

This intensive one day class presents all of the details required to establish data communications with an IBM PC XT/AT or compatible. This includes having your PC communicate with other PC's, mini computers, mainframes and standalone word processors, an RS232C short course on wiring a data channel, how to select, checkout, and use a modem, evaluation of your communications requirements to assure the choice of the right software package and communications protocols. Detailed demonstrations are presented for installing and using communications software. Floppy discs containing important communications software and utilities will be distributed to the attendees. These programs are for communications, text compression, encryption and automated operations. The programs ensure that participants will be able to return to the office and start using their machine for communications.

Linking PC's to Larger Computers

A PC to mainframe or mini computer terminal link is established through the standard asynchronous communication adapter or with a synchronous communication adapter product. The spectrum of vendor products for both these modes of terminal emulation are described and presented. Techniques for bringing mainframe data into PC application programs like LOTUS and dBASE are described along with the required data conversion methods. The integrated link products that load to the PC directly from mainframe data bases are evaluated and compared.

Who Should Attend

This class has been designed for PC users, managers, data processing and communication personnel who wish to start up and use data communications immediately.

Workbook and Software

Each attendee will receive a comprehensive workbook and floppy disc containing vital communications software and utility programs.

In This Class You Will Learn

- PC Data Communications Terminology and Techniques
- Wiring and Controlling a Modem
- Unattended Remote Communications
- Communications Software Options
- How to Insure Data is Transmitted Error Free
- How to Link a PC to a Mini or Mainframe
- Data Conversion Requirements for Uploading and Downloading
- How to Reduce Communication Cost
- Security Issues

Course Director

Refer to page 2.

Course Outline

1. Personal Computer and Data Communication Background

The PC/XT/AT Architecture
Introduction to Data Communications
  Code Set and Control Functions
  Asynchronous and Synchronous Transmissions
  Protocol and Handshaking

2. Data Communications - The Physical Aspects

An RS232 Short Course
  Wiring the Channel
  Modem Interfaces
  The Telephone System Limitations
  Smart Cables and Break-Out Boxes

3. The Modem

Synchronous vs. Asynchronous Operation
Speed (1200, 2400, 9600 bps or greater)
What about Hayes Compatability?
Selecting the Modem
Modem Checkout (loopback procedures)

4. Software Requirements

Auto Answer, Unattended Operation
Terminal Emulation
File Transfer and Capture
The Importance of Error Checking
Protocols (XMODEM, Telelink, Kermit, X.PC)
Software Packages (Carbon Copy, Crosstalk, Access)
Why Not to Use Framework & Symphony Communications

5. Data Communications with Mainframe and Mini

Terminal Emulation Products (IBM, CXI, DCA, etc.)
Protocol Converters
Integrated Links (Informatics, MicroTempus, PC Focus, etc.)
Loading Mainframe Data into Lotus, dBase III, etc.

6. How to Reduce Line Costs

Data Compression and Multiplexers
Using Leased Lines
Packet Networks

7. Organizational PC Data Communications Issues

File Uploading and Downloading Issues
Security Problems

The IBM Token Ring LAN

A guide for Planning, Implementation and Managing the IBM Token Ring and other PC Networks

Edmonton: Château Lacombe
November 19-20

Toronto: Venture Inn
June 4-5
October 8-9

Hull: Hôtel Plaza de la Chaudière
June 11-12
November 5-6

Vancouver:
Westin Bayshore
December 3-4

Calgary: Delta Bow Valley
October 1-2

Toronto: Sheraton Centre
November 19-20

Montreal: Grand Hôtel
July 9-10
October 22-23

Halifax:
Château Halifax
December 10-11

FEE $895 LESS DISCOUNTS ON BACK PAGE

What's Happening

Local Area Networking has finally come of age. The IBM Token Ring Network is now the industry standard, and "compatible" networks have appeared. There are major problems associated with implementation due to deficiencies in the products, user misunderstanding of capabilities, and fast changing technology.

Who Should Attend

This seminar is designed for PC users, managers, analysts, DP and data communications professionals who are responsible for evaluating, installing and using LANS. Attendees are presumed to have worked with a PC or other computer system. No prior knowledge of Data Communications or Networking is required.

Why You Should Attend This Seminar

This intensive 2 day seminar presents all of the information required to configure, install and use a Token Ring network. Hardware installation and cabling are described along with potential pitfalls. The critical software commands for installing, configuring and operating a network are presented along with techniques for automating operations and organizing network hard discs. Participants learn which applications software to use on a network as well as which ones are to avoid. Techniques of using IBM and third party products to link the PC to the mainframe at low cost are defined.

What You Will Learn

- LAN Terminology and Techniques
- LAN Configuration and Instalation
- Using the IBM LAN Software
- How to Install Application Software
- When to Use non-IBM Products
- How to Improve Performance
- LAN Expansion Techniques
- Gateways to Mainframes
- Accessing Other Vendor Networks
- Management and Operational Issues
- Available Troubleshooting Tools
- Security Techniques

Course Outline

1. **PC Background**
   - PC Architecture and Software
   - Operating Systems PCDOS, UNIX, Xenix
2. **Local Area Network Background**
   - Network Operating Systems
   - Topology (BUS, Tree, Star Wired Ring)
   - Access Technique/Protocol
   - Medium (Wire Pair, Coax, Fibre Optic)
   - Adapter Cards
   - The Vendors (IBM, NOVELL, AT&T, 3COM, etc.)
3. **The Token Ring Hardware**
   - Interfacing a PC into the Network
   - Multi-Station Access Unit (MAU)
   - Network Adapter Card
4. **The IBM Cabling Systems**
   - Rationale and Limitations
   - Data Grade Cable Type 1, 2, 6, 8 and 9
   - Voice Grade Cable Type 3
   - Integrating Existing Terminals
5. **Hardware Installation**
   - Maximum Lobe and Drop Length
   - Validating Existing Voice Grade Cable
   - Server Non-interruptible Power Supplies
   - Installation Pitfalls
6. **LAN Operating Systems**
   - Interfaces
     - PC-DOS Redirector
     - NETBIOS
     - APPC (LU6.2)
     - Adapter Handler and Direct
   - Alternatives to IBM
     - NOVELL, BANYAN, TORUS, 3COM, etc.
7. **Using the IBM LAN Program**
   - Menu or Direct Command
   - Configurations: SRV, RDR, MSG
   - Sharing Directories and Printers
   - Messaging
   - Network Status
   - Automatic Startup
   - Limitations
     - Lack of Control, Security, Electronic Mail
8. **Improving Performance**
   - Server Tuning Parameters
   - Other Vendor High Performance Servers
9. **Application Software Installation**
   - Multiuser Applications
     - File and Record Locking Schemes
     - Recognizing Ill Behaved Software
   - Using the IBM Installation Aid
   - User Installed Software
   - Batch file Automation
10. **Expanding the Network**
    - Network-to-Network Gateways
      - TR-TR and PC Network Bridge Program
      - PC NETWORK Interconnect Program
      - Copper and Fibre Optic Repeaters
      - Gateways to Other Vendor LANS
    - Network-to-Mainframe/Midrange Gateways
      - 3270, 5250 Gateways
      - Asynchronous Communications Gateway
      - APPC/PC (LU 6.2)
11. **Network Operation/Management**
    - Administrative Concerns
    - Operator Considerations
    - Potential Multi-user Problems.
    - Data Security Check List
    - System Operation/Troubleshooting
      - Token-Ring Diagnostic Program
      - Token-Ring Network Management
      - NETVIEW PC

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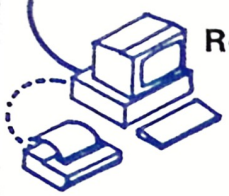

Registration Information Call (514) 243-0709 8:30 am to 5:30 pm Eastern Time

Guarantee — If you are not completely satisfied with the quality of the seminar, and its usefulness to you, you may withdraw before the mid-point and receive a full refund.

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Discount schedule: Any individual registering for more than one course is entitled to 15% discount. It is NOT necessary to register simultaneously to be eligible for this discount. Payments received 30 days before the seminar date are eligible for 10% discount from the fees quoted herein. These discounts may be combined.

Cancellation Policy: The fee is 100% refunded if cancellation is made at least 3 business days before the seminar. 50% is reimbursable up to the start of the seminar. Substitution of individuals, and transfers to other dates and/or locations can normally be accepted at no charge.

Course schedule: 9 am till 5 pm each day. Informal discussions will continue thereafter as long as students wish. Registration commences at 8:15 on the first day.

Hotel accommodation: A block of rooms has been reserved in the seminar hotel until 30 days prior to the seminar. Participants are responsible for their own reservations and hotel costs.

Luncheons: Informal discussions amongst participants is encouraged at the seminar luncheons, where ideas, opinions on software and solutions to problems flow freely.

SOME PLACES ARE STILL OPEN FOR OUR SPRING SERIES

Implementation of the IBM-PC in large organisations

Winnipeg	April 7–8
Toronto	April 21–22
Montreal	April 27–28

Data Communications and Networking for the IBM-PC

Winnipeg	April 9–10
Toronto	April 23–24
Montreal	April 29–30

dBASE III PLUS

Ottawa	March 11–13
Toronto	March 25–27
Montreal	March 30–April 1

ALMOST FREE
PC SOFTWARE VOLUME XXI

Cache A disk cache program allows one to vastly speed up the disk access of a PC by stashing frequently used sectors in memory. This public domain cache program is extremely fast and fairly intelligent as to which bits of oxide it decides to retain.

Dev This a tiny utility that will locate the device drivers in your system's memory. Includes the assembler source code.

Emacs This is the very last word in well executed programmers' text editors. It has multiple windows, macros and will even create a DOS shell for you so that you can skip out for a while to execute another task. Requires NANSI.SYS, below.

Musicsystem This is a pair of programs which allow you to edit and play three voice music on the PC. You may wonder how one gets three voices on the PC's speaker... it's tricky, but this code manages it. Several sample songs are also included. Not terribly happy with PC/ATs.

MTS The drag about DOS is that it only wants to let you run one program at a time. With MTS you can run two, flipping back and forth between them at the stab of a key. This is the first one of these things that's bug free.

Small programs are often the best ones... they're always the cleverest. This collection of almost free software for the PC contains some of the neatest small programs we've encountered for a while. Some of them are wholly indispensible.

Included on this disk are things like NANSI.SYS, an ANSI driver replacement which does amazing things to one's tube, COREWARS, the first true computer game... and even a COMMAND.COM replacement to implement a much more powerful operating environment.

As with all our almost free software, this code has been carefully checked for bugs... and for trojans and other disk destroyers lurking within it. Your computer will be amazed.

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MIDIzap Figuring out the secret codes that drive some of the more sophisticated MIDI instruments is a lot easier if you have something to send and receive them with. This little MIDI debugger runs with the popular Roland MPU-401.

Corewars Perhaps the first program to truly embody the spirit of the phrase "computer game", Corewars pits two programs against each other. The object of the game is to crash the other code. Quite a blast when space invaders has lost its allure.

NANSI.SYS A replacement of ANSI.SYS, the improvements in the performance of your system that NANSI can lay down are almost godlike. It includes a high speed screen driver and additional escape sequence screen handlers.

Shell This is a COMMAND.COM replacement that implements a Unix-like environment. It supports a lot of features that DOS would like to have, and a much tighter command structure. It's surprising how easy it is to get to like Unix.

View This is the fastest full screen file browser in creation. It allows you to page back and forth through a file... it's a much slicker approach than the DOS TYPE command. Requires NANSI.SYS, above.

SAFE SOFTWARE NO TROJANS

SAFE SOFTWARE NO TROJANS

Fine Print: This software has been collected from public access bulletin boards and is believed to be in the public domain. We have checked this software carefully to insure that it functions as it should. However, we cannot assist you in adapting it to your specific applications.

Moorshead Publications warrants that these programs will be readable when you get them. However, magnetic fields, cosmic rays, truck tires or the bends may adversely affect your disk in transit. If it doesn't function properly when you receive it please contact us for a prompt replacement.

Our latest software catalogue lists a variety of interesting, low cost programs. Circle reader service card number 100 for a **free** copy.

The MD-4000 Medical Billing Package Review

With the plethora of medical billing packages springing up... some of which seem calculated to send you to your own doctor... it's becoming increasingly difficult to spot the workable ones. Here's a good choice.

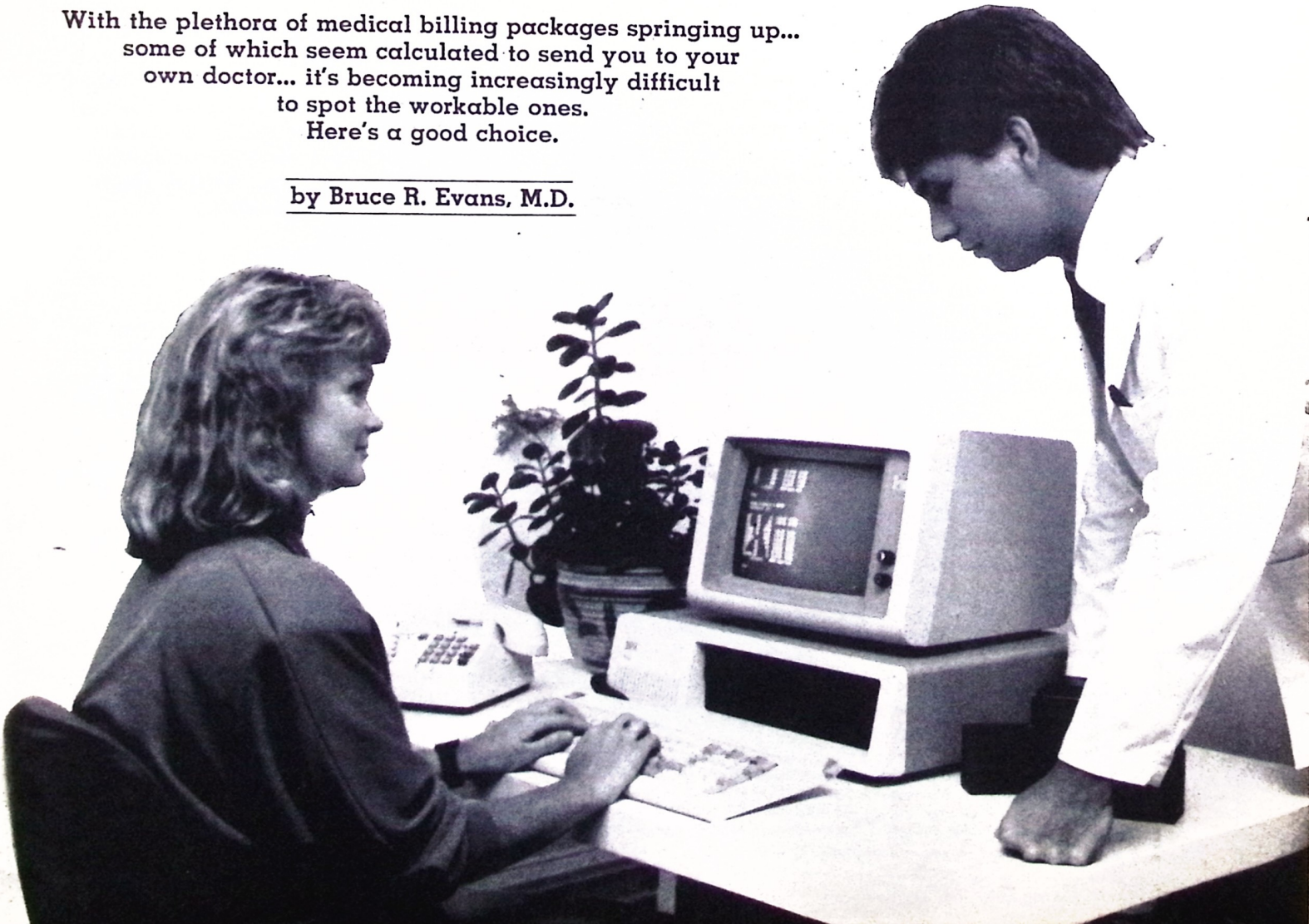
by Bruce R. Evans, M.D.

Although, the MD-4000 software is available separately, its manufacturer, Don Wallace Associates, prefers to sell a package with hardware. I tested this program on an IBM-XT, an AT clone and a Texas Instruments Business Pro. It ran adequately on the XT but really required the power of the AT. The Texas Instruments configuration is a bit different. The Business Pro can run in "AT Mode", mimicking the AT, or it can run in "TI mode" which is much faster and supports a colour screen good enough for word processing. In the first instance, you can run the standard MD-4000 package. However, if you can spring for the TI, there's a package specifically for it. It's worth the difference.

Another reason DWA prefers to sell systems rather than just software is the initial set up. MD-4000 uses more directories than Ma Bell. In addition, this program uses a RAM disk to speed up changing between functions. An experienced user could probably get everything running after a few errors, but my office isn't the place to learn.

The Dreaded Bill

Although DWA says all medical billing systems can bill, I was sufficiently skeptical



to check out MD-4000's billing functions first. A good billing system must keep track of all my patients and their billing information. This includes, obviously, their names, addresses and phone numbers. As well, it should keep track of their insurance numbers: OHIP, Workers' Compensation or private insurers. Moreover, your secretary should have to enter all this material only once, when a patient is seen for the first time.

This ideal system should take this information along with information entered during your patient's visit and prepare a bill. Then it should keep track of if and when these bills are paid. Naturally, it should let you in on how it's managing by printing out such reports as a day book, monthly summaries and year to date reports.

With MD-4000, this process begins with a patient registration screen. This screen is divided horizontally into three parts. The top provides demographic data such as name and address, the middle has insurance data and the lower third contains clinical data.

The demographic space is self evident. Each patient is assigned a number either by you, or automatically by the system. However, using a code number doesn't prevent you from searching for patients by name or insurance number later. There are a few shortcuts in this area. You can customize single keys for each city and the province can be made to default to yours. Mandatory fields must be filled in or the system will remind you to do so. However, you can get by with minimal information for emergencies or new patients who've forgotten their insurance numbers but promise to phone back later.

The insurance section handles OHIP, Workers' Compensation, the Quebec medical plan and private medical plans. It can also cope with an insurance policy registered under a surname different from your patient's. This is often a problem with common law relationships or wives who continue to use their maiden names. Unfortunately, this system can't search for patients by these secondary names. I'd find that a useful feature.

The lower third gives a small amount of clinical data. I've always been negative about this mixing of clinical and billing data but I've been convinced it can make sense. With MD-4000, you include a major diagnosis such as diabetes, the date of the first and last visit and a status field. It was this status field that convinced me of the value of clinical data in this screen. You can write down that the patient is always late for appointments or a perennial no show. This helps your secretary in booking appointments. You can also add immunization information so that your secretary can immediately tell a caller whether or not her son needs a tetanus shot for his vampire bite.

As well, in this lower third, there's room for the date of a last major examination which can save you grief by preventing you from billing OHIP for more than it allows. In addition, you have the date and reason for the most recent recall. Since you can search your patient base by these entries, it makes tracking patients for preventive care easier and more efficient.

After you've seen your patient, your secretary enters the diagnosis and type of visit. MD-4000 makes this very simple. You enter diagnoses and visits in English, not bureaucratic codes such as 895 or A001. In fact, you can customize the program to let you use abbreviations such as PREG for prenatal visit or BP for a blood pressure check. To carry it even further, you can create "super diagnoses" that are actually a cluster of diagnoses and procedures. For example, you might code AHA to mean an annual health exam in an adult male that also includes certain blood, urine and X-ray tests. The system will get all the OHIP codes and fees right with just three letters.

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SPECIFICATIONS

PROCESSOR
- Intel 80286 true 16-bit microprocessor.
- Switch-selectable 6 or 8 or 6/10 MHz clock rate.
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MEMORY
- 640K of Ram with parity checking, expandable to 1MB.
- 32K of ROM with Phoenix BIOS, expandable to 128K.
- 50 bytes of configuration CMOS RAM, with battery backup.

DISK/TAPE STORAGE
- One 5.25" double-sided, high capacity floppy disk in a separate sub-chassis with a formatted storage capacity of 1.2 MB.
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EXPANSIONS
- A total of 8 expansion slots will accept various system-expansion options, such as colour/graphics video controller card, additional memory, I/O-device control, and others.

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- Optional One Serial/parallel printer adapter card, contaning 1 Centronics-compatible parallel port and 2 RS232C compatible serial ports with variable baud rates and full hand-shaking.

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(Dealer inquiries welcome)

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Using the relevant fee schedule, MD-4000 will now look up and enter the appropriate amount. Alternatively, you can over ride the system and use an individual fee. One of the nice things about using MD-4000 is that when OHIP changes its fee schedule you'll get a new one on a floppy disk that your system can read and adjust itself. Unfortunately, you still have to manually change Workers' Compensation and private insurance fees but the procedure for doing this is very fast and simple.

Naturally, at this point, you'd like to get paid for all your work. MD-4000 handles this four ways. It'll create floppy disks for submission to OHIP and even print the mailing label. It'll also print out OHIP claims cards for the few instances where electronic submission isn't permitted. It'll print out Workers' Compensation claim cards because WCB still won't accept floppies. Finally, you can print out a bill for services not covered above.

The biggest benefit of using a computer in a medical office is what happens after you've sent away your bills on floppy disk to OHIP. Within a week, you'll receive a floppy listing any problems on the disks you've submitted. Soon after, hopefully with your cheque, you'll receive floppies from OHIP with information on which claims have been fully or partially paid. MD-4000 reconciles this information with your accounts receivable at the rate of about three minutes per disk and gives you a print out of any discrepancies. You can expect MD-4000 to pick up at least a few errors each month that would have been lost revenue to you. Funny how errors by provincial health plans are always in their favour.

Other Features

MD-4000 is both menu and command driven. For the first few weeks in your office, you'll prefer to have the help of all the screen menus. This way you or your secretary can see what tasks are available and decide in what order to do them. There's no confusion over what must be done. You'll want to use the menus again when you train new staff or if you have replacements for vacations or illnesses. MD-4000's use of a RAM disk makes this menu flipping fast enough to be tolerable.

After a few weeks, your staff will be getting impatient going through menus strewn along the path to each function. With MD-4000, they can by-pass these menus by simply entering the number of the desired function. This lets your secretary jump between billing functions and patient data. This is handy when there's a patient on the phone wanting to give a new insurance number, make an appointment or check on any outstanding bills. However, the menus are always available if any problems crop up.

MD-4000 doesn't include its own appointment system because most offices are served better by a manual one. However, your secretary will appreciate being able to enter all the appointment data into MD-4000's encounter sheet. She can create this the day before it's needed by typing in the names or clinic numbers of all the patients booked for that day. After this function is completed, it will print out an in/out checklist of all the patients with the time of their appointment along with their diagnoses.

A really nice feature of MD-4000 is its ability to network. You can have two or more terminals hooked up to the same system. This makes the integration of accounting and clinical material less of a problem than it would be on a single machine. Your secretary can use her machine at the front desk while you access clinical data from your desk.

There are two other notable features of MD-4000. The first is a patient profile screen. This allows you to keep a record of a patient's last twenty visits, his problem list and his past history. There's also room here

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for test results. I keep thinking of this feature as I write out letters to consultants or transfer letters to another family physician. With MD-4000, all I'd have to do is print out this screen and mail it.

The second screen is a patient medication screen. This allows you to list up to eight drugs a patient is taking along with the dosage, the quantity prescribed, the date of prescription and the dates of all refills.

It's fine for me to tinker around with this system but I sure don't want my secretary taking months to learn it. As well, I don't want half my accounts wiped out as a learning experience. MD-4000 gets around this by providing sixteen hours of training. They advise four sessions of four hours each and come to your office for this. If you run into problems later, there's a toll free telephone number included in your first year of free service.

MD-4000 doesn't include an accounting package but DWA will sell you one that integrates with MD-4000. In addition, they can include a word processor so that your secretary can jump back and forth between her typing and her receptionist duties as the need arises or the phone rings. Neither of these packages was included with my review copy but MD-4000 is sufficiently well behaved that it didn't hang up when I tried to call these functions. Each time it just returned me to an earlier menu.

Plans:

Software:	MD-4000
Systems:	IBM-XT, AT, Texas Instruments Business Pro
Application:	Medical billing package
Source:	Don Wallace and Associates, Medical Office Computer Systems, 577 Somerset Street West, Ottawa, Ontario M1S 3L1, 1-800-267-0411 OR 1050 Bay Street, #595, Toronto, Ontario M5G 2C2, (416) 979-6744
Price:	$7000 - $10,000 depending on hardware

The Cost

The cost of all this is, predictably, not insubstantial. You should figure on about ten thousand dollars for hardware and software using an AT compatible computer put together by DWA and an adequate printer. This would be a bit less if you used an XT compatible and a bit more if you used an IBM AT or Texas Instruments Business Pro.

When you buy a complete system, the first year's service is free. From then on, you can buy a service contract for the hardware and software. Don Wallace and Associates handle this. If worst comes to worst, they'll ship you a replacement machine by courier. Considering the excellent service I got on their 800 number, I wouldn't expect any service problems.

In summary, MD-4000 is a good example of the new generation of software available for medical office computer systems. It handles the basics in a professional manner but doesn't stop there. Yesterday's bells and whistles are today's necessities. MD-4000 goes on to make the most of the your computer and medical practice. Don't buy any computer system until you've looked at MD-4000 by Don Wallace and Associates. **CN!**

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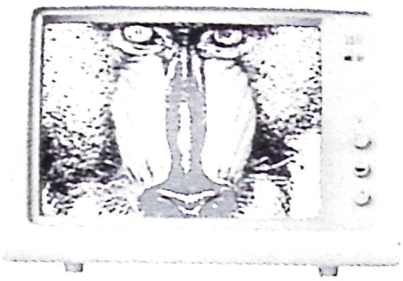

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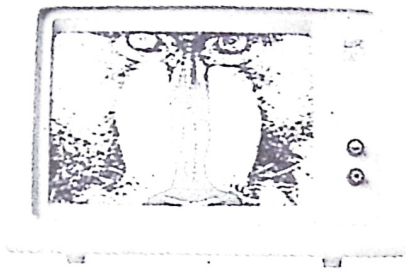

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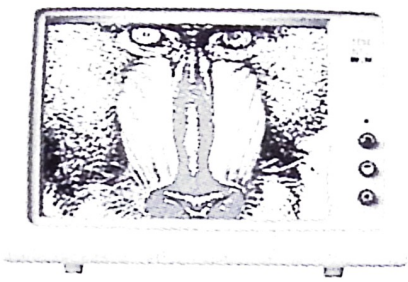

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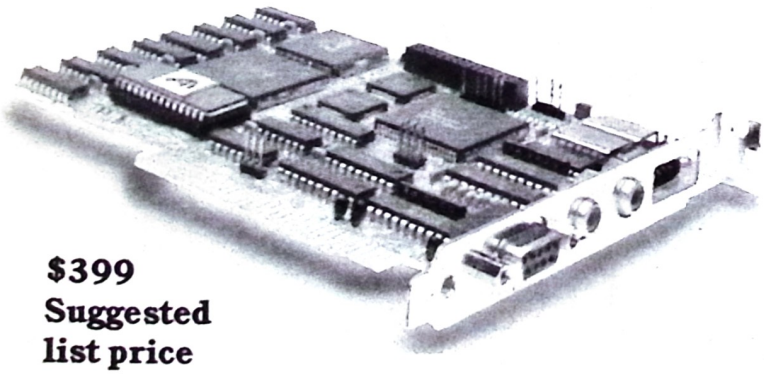

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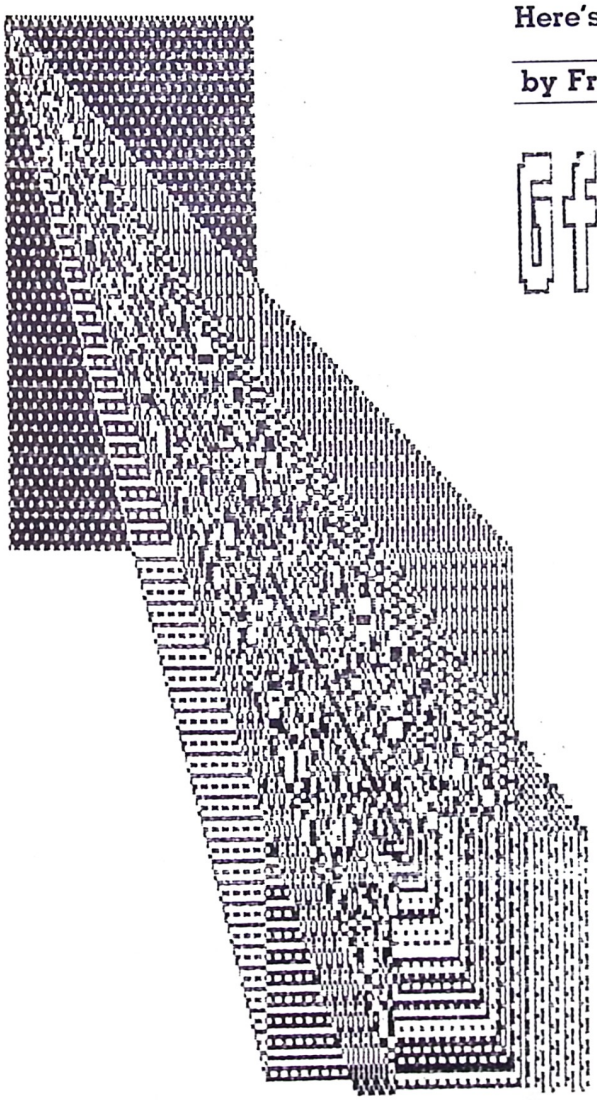
GFA BASIC
for the Atari ST

A good BASIC implementation would certainly make the Atari ST a more pleasantplace to kill time in. Here's a look at one.

by Frank Lenk



GfA BASIC Interpreter

The trouble with owning a very powerful computer like the Atari ST is that it usually takes a very powerful... and hence complex... language to tame the beast. The Atari is blessed with a rather amazing selection of languages, including several varieties of C compilers, Pascal, FORTRAN, Forth, and so on *ad infinitum*... almost. Until recently, the one language not well represented on the purportedly user friendly ST was the most notoriously user friendly language of them all... the dreaded BASIC.

This takes some explaining. Actually, BASIC was one of the *first* languages available for the ST. The ST comes from the show room complete with a whole mess of software, including no less than two entire programming languages... LOGO and BASIC. Unfortunately, Atari's original ST BASIC was a bit of a dog. It featured really annoying windowing, limited system access, no structuring or similar extensions, and a certain number of out right bugs. As such, it was just about good enough for those silly little jobs that BASIC is usually good for. It was enough, in other words, to entertain a fledgling ST hack, but drastically less than sufficient to allow deeper delving into the mysteries of the Atari machine.

Atari has not been standing idle amid the chorus of user discontent. Even while the emphasis in the ST community was shifting to compiled languages such as the omnipresent C, Atari was rewriting the original BASIC. Rumour has it that this updated version will be available "soon".

Meanwhile, out of left field... rather far left, in this case... we have a completely separate attempt to provide the basic ST BASIC. GFA Systemtechnik... of Germany, naturally... has wrought a rather interesting implementation of the language. This is being distributed in North America by MichTron.

GFA BASIC is unique in its painstaking attempts to provide complete support for the extensive ST environment, while maintaining the comfortable, homey feel of good ol' BASIC. Fortunately, however, GFA has taken the sensible rather than the literal interpretation of this venerable interpreter... adding in all the modern conveniences such as structuring. GFA BASIC doesn't even use line numbers. Instead, it emerges as a sort of entry level, Pascal like, totally generic programming environment.

```
Save | Save,A | Quit  | New   | Blk Sta | Replace | Pg up   |        | Direct | Run
Load | Merge  | Llist | Block | Blk End | Find    | Pg down | Insert | Flip   | Test
    Next F
  Until Timer>Target
Return
Procedure Fill
  Ellipse 320,200,320,200,-7200,0
  Print "Click on Area to fill"
  Target=Timer+2000
  Repeat
    I=(I+1) Mod 36
    Deffill Random(3)+1,3+(I(24),I Mod 24+1
    Repeat
    Until Mousek
    Fill Mousex,Mousey
  Until Timer>Target
Return
Procedure Rect1
  Graphmode 3
  Target=Timer+2000
  Repeat
    Box I Mod 640,I Mod 200,639-I Mod 640,199-I Mod 200
    Add I,8
  Until Timer>Target
Return
```

Ach, Du Lieber

Like any self respecting BASIC, GFA lives in a world of its own... in this case, a peculiar sort of integrated editor. GFA, alas, does not see fit to support very much of the GEM environment in which Atari has painstakingly enshrouded the ST.

I'd be tempted to say that this is no great loss, except that it does tend to cut one off from the few amenities available on the ST... notably, one's desk accessories. Think of the reaction one might expect of... say... a word processor on the IBM PC, that wouldn't allow users to run SideKick. This isn't exactly a hypothetical example, since XyQuest was pretty much coerced into rewriting the XYwrite III screen interface precisely in order to allow pop up utilities to coexist with the editor.

As idiosyncratic editors go, GFA's is not bad. The familiar WordStar cursor commands are sadly absent, but the alternatives are not as bad as one might expect. Cursor movement is via the arrow keypad or by mouse. Control and the arrow keys give the next level of movement... page up or down, line start and end. Then things get funky. Try control home for top of file and control Z for end of file. The correlation between these latter two keycodes escapes me.

Which brings us to the escape key. This toggles back and forth between the editor and a peculiar sort of command line environment. The command line features a prompt that looks like this:

```
OK >
```

Where most BASIC systems use line numbering to distinguish between immediate and program modes, GFA has this page flipping as an alternative. Most, but not all, BASIC commands can be executed from the prompt. You can also do things like DIR which works pretty much the same as in MS-DOS, even down to the use of wild cards. LOAD is similar, and supports the same backslash directory specifications as DOS.

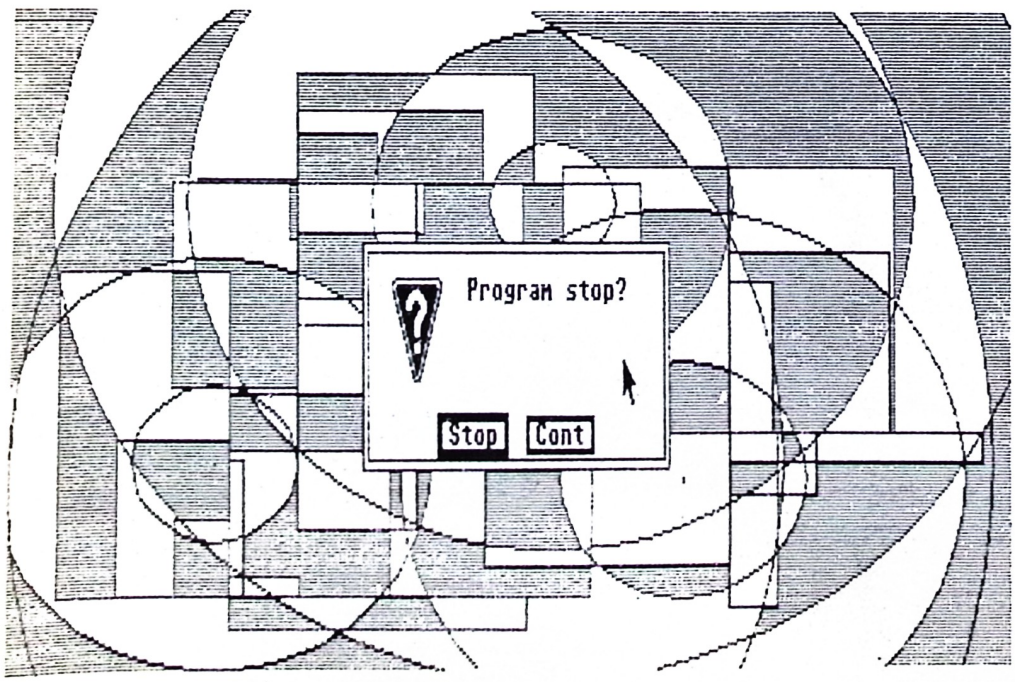
The only real oddity is that you have to hit escape return to get back to the edit screen. This no doubt has to do with the way characters are passed to the operating system.

In the editor itself, a highlighted bar at the top of the screen presents some of the immediate mode commands... save, load, merge, run... as well as a goodly number of editing functions... block start and end, page up and down, or insert. These are accessible by mouse, and in most cases by key commands. The key assignments are not *too* bad... F1 to load, shift F1 to save, F6 for find, shift F6 for find and replace. The latter two options prompt the user to type in the search and replace strings, but don't actually begin the operation. For that you go to control F or control R.

GFA is not well served by its documentation. The manual is a half size, three ring affair, containing twenty-four pages of text and over two hundred and fifty pages of appendices. Despite this encouraging ratio, it turns out that this manual is totally inadequate to explain the use of the language to which it refers.

The first few pages tell you a bit about the language, then launch into a detailed description of the editor commands. The command summary on page sixteen and seventeen is followed without so much as a pause for breath by a dissertation on numerical and character string functions, and this in turn gives way to a very detailed analysis of logical operations... even including truth tables to explain the meaning of concepts such as NOT or AND. The table for EQV is particularly interesting, in so far as it states that if A and B are both true, "A EQV B" is both true and false.

Most of the manual consists of an alphabetized reference to GFA commands. This is great, as far as it goes. Unfortunately, there are incomprehensible divisions in the listing. Three separate appendices contain three separate sets of "commands and functions". What the division is meant to signify is never made clear. One can deduce that some of the classification refers to standard BASIC commands versus GEM system tie



ins, but this is only a guess.

The individual command listings, on the other hand, are excellent. Each specifies the type of expression... command, function, graphics command, I/O command, arithmetic command, and so on. Then it tells you how to use it by summarizing the syntax. Then, just to make sure you get it, there's an example, followed by a text explanation. For instance

```
I/O Command OUT

How:  OUT x,a
      OUT #n,a
      Abbr.: OU
      Example:  OPEN "O",#1,"DAT"
        OUT #1,65
        CLOSE #1
        OPEN "I",#1,"DAT"
        PRINT INPUT $(1,#1)
        OUT 2,66

Purpose: Transfers a byte with the value `a'
to a peripheral device/file.
```

The explanation text then tells you that X is an integer expression with a value between zero and five, and corresponds to one of the standard devices... LST, AUX, CON,MID,IKB and VID. The alternate form of the command lets you know that the "#" is optional.

The documentation is more of a shopping bag of possibilities than it is an education on how to actually accomplish any specific task. Thus it is a hacker's dream and a working programmer's nightmare.

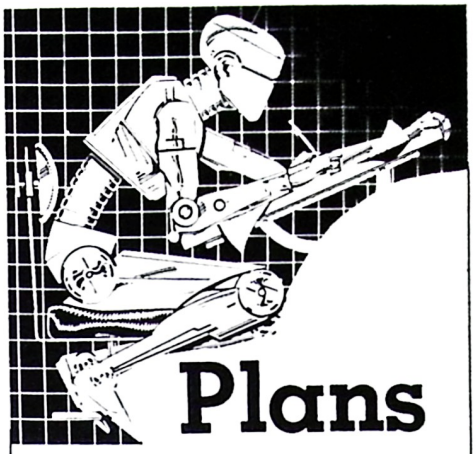
Several demonstration files are included with the GFA system, and these are quite helpful, although at least one fails to work the way it's supposed to. Unfortunately, there is little sign of comments within the supplied source code, so once more you're back to your own devices. Learning GFA is a trial and error process.

Donner Und Blitzen

GFA BASIC is absolutely crammed chock full of the most remarkable sorts of functions. Naturally, this includes the math operations, the BASIC staples such as BLOAD, BSAVE, DATA, DIM, END, GOTO, GOSUB and so on.

There are the graphics commands, familiar to users of Atari's ST BASIC. These include things like BOX, POLYLINE, CIRCLE, DEFFIL, FILL, PCIRCLE, ELLIPSE, PELLIPSE, PLOT and others. GFA BASIC goes on to provide a full set of GEM windowing commands, such as CLEARW, OPENW, CLOSEW, FULLW, DEFMOUSE and others. These open a window, close it, expand it, and so on. DEFMOUSE lets you change the shape of the mouse cursor.

Low level GEM and VDI commands include BIOS, XBIOS, GEMSYS and VIDSYS, which let you call functions at various levels of the ST operating system. VDIBASE returns the address of GEM's VDI parameter table. The manual lists the purpose of this command as "dangerous pokes!", and cautions that "no responsibility is accepted for the results." You have been warned.



Plans

Software:	**GFA BASIC**
System:	**Atari ST**
Application:	**Programming Language**
Manufacturer:	**GFA Systemtechnik**
Availability:	**MichTron Inc., 576 South Telegraph, Pontiac, Michegan 48053, (313) 334-5700**
Price:	**$79.95**

There are honest to goodness DOS commands, as well. These include RMDIR, CHDIR and CHDRIVE. EXIST lets you check if a named file is actually present where you think it is. KILL lets you obliterate it.

Then there's an odd lot of powerful accessory commands. For instance, the function C lets you call a machine code or compiled C subroutine, with C standard transfer of parameters. This is in addition to the usual CALL command. The asterisk operator, in addition to its normal role in multiplication, can be used much like the ampersand is in C, to refer to a variable's address. Similarly, GFA allows you to use the double equal sign as in C, to represent comparison.

The BITBLT command provides a fast raster copy, whomping one block of pixels into another. BMOVE is the more general block memory move. SGET and SPUT copy and restore the entire screen area to and from a specified string variable, for convenient page flipping. VSYNC makes the screen refresh sync pulse available, so you can cut down on screen flicker.

For structuring, you get a wide range of choices, starting with the humble but still useful FOR NEXT loop. The DO EXIT LOOP creates an endless loop with a specified exit condition. The IF ELSE ENDIF structure does its usual work. WHILE WEND gives you yet another kind of loop. REPEAT UNTIL is the same, but checks your condition only after executing the loop at least once.

Considering the absence of line numbers, it's not surprising that the GFA GOTO goes to a labelled position in your program. GOSUB lets you call up a "procedure". Unlike most BASIC subroutines, GFA procedures are allowed to have local variables. DEFFN defines a named user function, with parameters.

Several math commands are a bit unusual. The commands ADD, SUB, MUL and DIV can be substituted for the usual math operators, apparently providing increased speed of execution. For instance, the INC command increments a variable, saving on program storage and executing as much as three or four times faster than the usual addition and reassignment operation.

DEFLIST lets you select from two different listing formats. You can have GFA automatically capitalize either the first letter of all command and function names, or print the names in the conventional all caps format. The editor is rather nice in this respect. For instance, abbreviations are expanded to their full text equivalent as soon as you move on to another line. Indentation within loops and procedures is automatic... a feature to be envied by editors of all creeds and colours.

Sauer Grapes

None of this exhausts the GFA arsenal. There seems to be very little that one couldn't accomplish with the language, given enough time. One of the demonstration programs opens a GEM window and displays random graphics in it, showing the level of system control you get. However, one shouldn't get too carried away with enthusiasm. GEM programs in GFA seem to be every bit as long and complicated as they would be in C. The sad fact is that making all those windows and things happen takes a lot of coordination, and no language can do it for you.

On the brighter side, what GFA does do is to provide a fast, easy way to poke around in the guts of the ST, and possibly even write some useful code.

GFA includes a run time module, which relative file sizes would indicate is probably identical to the complete language but minus the editor. The advantage of the run time program is that it saves a little bit of disk space and runs your code directly without the usual dialog through the command line. However, the overall effect remains a bit crude.

More encouraging is the fact that a fast, two pass GFA compiler is already out there somewhere. I haven't seen it yet, but if it's as well built as the interpreter, it should make GFA BASIC quite a realistic development tool... for the right sort of job. If you treat the ST as an empty box with a 68000 inside it, programming doesn't have to be a chore.

Who needs GEM anyway? **CN!**

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Continuo in C

This assembly language module allows higher level languages... most notably C... to play music as a background task. It's a particularly interesting use of the PC's lesser known hardware.

by Steve Rimmer

Silent programs are rather dreary things. I suppose that if you're writing a data base manager to keep track of the bi-annual migration of semi-literate reindeer installers it might be inappropriate to have it play the greatest hits of the Bonzo Dog Band while it's waiting for a file to load. On the other hand, it won't being doing much else.

Most of the fancier computers one encounters have bits to manage sound in ways that don't make one think of mechanical music boxes. Even computers which don't have really sophisticated sound generator chips can usually manage background sound. This means, in effect, that having issued the command to play something the computer can subsequently go about the next part of its program without having to worry about making the music go. It will continue to play, all by itself, until it's done.

The PC can't do this... or, at least, there is no provision in the operating system to manage it. In fact, there is barely any way to beep the speaker at all.

By very sneaky manipulations of the PC's interrupts and hardware it *is* possible to write a background music function for it. We're going to look at such a thing here. This code, callable from any C program, can accept a string of music commands and set up the PC to play it. However, it will hand control of the system back to the calling program immediately, instead of forcing it to wait for the end of the performance.

Programs which play incidental music, or just use sounds to draw one's attention to things, look very unprofessional if the rest of the circus seizes up until the sound is done with. This code allows you to have music going while your program does other things.

This may seem like it requires that the PC be performing two functions at once. It doesn't, actually. In fact, it just entails that one make use of a normally ignored part of the system.

Timer Ticks And Hardware Fleas

If you've ever tried to make music with the PC's internal squeaker speaker, you will probably have used a variation of the BIOS beep routine. This is a fairly straight up approach to making noises. It's based on the observation that one of the 8088's logical ports is hard wired to the speaker driver. Changing the value of the byte at that port changes that voltage on the speaker. Changing the value fast enough will result in the speaker changing at an audible rate, producing sound.

This is a beep routine.

```
BEEP:   MOV     BX,0C0H
        IN      AL,61H
        PUSH    AX
BEEP1:  AND     AL,0FCH
        OUT     61H,AL
        MOV     CX,48H
BEEP2:  LOOP    BEEP2
        OR      AL,2
        OUT     61H,AL
        MOV     CX,48H
BEEP3:  LOOP    BEEP3
        DEC     BX
        JNZ     BEEP1
        POP     AX
        OUT     61H,AL
        RET
```

As bits of code go, this one is conceptually primitive. It uses the timing loop at BEEP2 to create a delay which determines the frequency of the sound. This has a number of hassles. The first one is that the delay varies with the speed of the processor. As such, the note this code would produce would be higher on an AT than on a PC. It also means that, all other things being equal, higher notes will have shorter durations. More to the point, however, is that while the computer is busy looping, waiting for the sound cycles to time out, it won't be able to do anything else.

Calling this routine to create a beep will hang your computer until the beep ends. Writing a routine to produce music with it will leave you with code that ties up your whole PC just to beep away on the speaker. This is very low tech... eight bit in the extreme.

Fortunately, there is a better, if rather weirder, way to make noise.

Among its chips and other silicon manifestations, the PC has something called an 8253 counter timer. The PC/AT has an 8254, which is analogous. This thing has three independent programmable counters. Their functions vary, depending upon how they're used, but it's convenient for our purposes to think of them as being programmable frequency dividers. Put a frequency in, give the chip a number between one and sixty-five thousand or so and a frequency will come out equal to the input divided by the number.

The second of the three 8253 counter timers on the PC's mother board is connected so that its output drives the speaker. If you were to program it with a divisor number and enable it, the speaker would make a noise. In fact, it would continue to do so until the counter timer was disabled. While it was wailing away, the PC could run any sort of program it wanted, as the 8253 will operate independently of the computer once it has been set up, and the PC itself doesn't need this timer to work.

This, of course, is the basis of our music generating program. If we knew the right divisor numbers to program the chip with we could have it emit the notes of a properly tempered scale. These divisor values can be found at the top of the listing associated with this article.

Having programmed the counter timer to start playing a note, the PC could be allowed to get on with something else. Its attention would only be needed when it came time to turn the note off and go on to the next note in the song... a long time in computer terms. The drag in this is that... at least in simple terms... we're still stuck with using a timing loop to figure the interval. Timing loops tie up the computer and, as such, we aren't a lot further ahead.

Magic Variables

The value COUNT in the main program for this article is a magic variable. Under certain conditions, you can load it with a value and it will appear to decrement itself. Actually, it's doing no such thing. It's being decremented by some code, but the operation is taking place transparently.

The 1CH interrupt of the PC is the timer tick. It's connected to another one of the 8253's channels, which has been programmed to pulse about eighteen times a second. Like the beeper of a while back, it keeps doing this regardless of what the PC is up to, and, it does it at the same speed no matter what sort of PC or AT one is sitting in front of.

Every time this counter timer pulses, it causes the PC to throw an INT 1CH, just as if such an instruction had been encountered in the program the system was running. The vector for this interrupt normally points up into the BIOS, where it immediately finds an IRET instruction. As such, it usually does nothing.

Screen clocks use this function to drive themselves.

We can redirect the 1CH vector to point to other code. If we were to have it point to a routine which decremented the value of COUNT, this byte would seem to change all by itself.

Now, consider this method of generating sound.

```
        CALL    SOUND_ON
        MOV     BYTE PTR [COUNT],18
LABEL:  CMP     BYTE PTR [COUNT],0
        JNE     LABEL
        CALL    SOUND_OFF
```

This assumes that COUNT is a self-decrementing variable, that is, that it's being decremented through code run by the 1CH interrupt. The SOUND_ON routine turns on the second counter timer to start the speaker wailing. The SOUND_OFF routine disables it.

This will produce a sound which will last for about a second... eighteen hits of the timer tick interrupt. The program will keep looping to LABEL until the value of COUNT hits zero. We've still managed to create a timing loop, but we've done it in a rather more elegant way. For one thing, it's considerably more accurate than our earlier attempts.

In fact, we could have the same code that decrements that COUNT value check to see if COUNT has reached zero, and turn

```
            COMMENT -

            INTERUPT DRIVEN MUSIC THING
            MACHINE LANGUAGE MODULE
            FOR C (PROBABLY WORKS WITH
            ANY DECENT PC C COMPILER)

            copyright (c) 1987 steve rimmer

                    -
TRAP_NUMBER     EQU     1CH                     ;NUMBER OF TICK INT
TRUE            EQU     1
FALSE           EQU     0
WHOLE_TIME      EQU     16                      ;TIME OF WHOLE NOTE
SEP             EQU     '!'                     ;SEPARATOR CHARACTER

LONG_           EQU     FALSE

                IF      LONG_
A_OFF           EQU     6
                ELSE
A_OFF           EQU     4
                ENDIF


DGROUP          GROUP   DATA
DATA            SEGMENT WORD PUBLIC 'DATA'
                ASSUME  DS:DGROUP

VECTOR_OFFSET   DW      0                       ;PLACE TO SAVE REAL
VECTOR_SEGMENT  DW      0                       ;INT 16H VECTOR

PITCH           DW      2705                    ;CURRENT PITCH DIV
MUSIC           DW      0                       ;POINTER TO MUSIC

DURAT           DB      24                      ;CURRENT DURATION
PLAYON          DB      FALSE                   ;TRUE IF PLAYING
COUNT           DB      0                       ;COUNT DOWN BUFFER
OCTAVE          DB      1                       ;CURRENT OCTAVE
BUSY            DB      FALSE                   ;FLAG FOR BUSY

;THESE ARE THE LEGAL NOTES
NOTE_STRING     DB      'A','A'+80H,'B','C','C'+80H,'D','D'+80H,'E'
                DB      'F','F'+80H,'G','G'+80H,0

;THESE ARE THE LEGAL LENGTH (DURATION) ARGUMENTS
DURAT_STRING    DB      '12486',0

;THESE ARE THE LEGAL OCTAVE ARGUMENTS
OCTAVE_STRING   DB      '12345',0

;THESE ARE THE LEGAL MUSIC COMMANDS
VALID_STRING    DB      'ABCDEFGOLR',0

;THIS IS A TABLE OF THE 8253 TIMER CHIP DIVISOR VALUES FOR AN EQUALLY
;TEMPERED SCALE. IT STARTS AT A TWO OCTAVES BELOW MIDDLE C (110 HZ)
TONES   DW      5409,5085,4800,4527,4242,4006,3795,3606,3388,3181,3005,2846
        DW      2704,2542,2404,2253,2121,2003,1897,1803,1698,1590,1502,1423
        DW      1352,1271,1202,1126,1060,1001,948,901,845,795,751,711
        DW      676,635,601,563,530,500,474,450,422,397,375,355
        DW      338,317,300,281,265,250,237,225,211,198,187,177

DATA            ENDS

PGROUP          GROUP   PROG
PROG            SEGMENT BYTE PUBLIC 'PROG'
                ASSUME  CS:PGROUP

;THIS ROUTINE RETURNS THE VALUE OF THE BUSY FLAG
;
;       CALLED AS
;       i = play_busy();
;       int i;
;
                PUBLIC  PLAY_BUSY
                IF      LONG_
PLAY_BUSY       PROC    FAR
                ELSE
PLAY_BUSY       PROC    NEAR
                ENDIF
                SUB     AX,AX
                MOV     AL,BYTE PTR [BUSY]
                RET
PLAY_BUSY       ENDP

;THIS ROUTINE STOPS ALL PLAYING
;
;       CALLED AS
;       shut_up();
;
                PUBLIC  SHUT_UP
                IF      LONG_
SHUT_UP         PROC    FAR
                ELSE
SHUT_UP         PROC    NEAR
                ENDIF
                CALL    SOUND_OFF
                CALL    UNGRAB_VECTOR
                RET
SHUT_UP         ENDP

;THIS ROUTINE PLAYS THE MUSIC IN THE STRING PASSED TO IT
;
;       CALLED AS
;       play(music);
;       char *music;
;
                PUBLIC  PLAY
                IF      LONG_
PLAY            PROC    FAR
                ELSE
PLAY            PROC    NEAR
                ENDIF

                PUSH    BP
                MOV     BP,SP

PLAY_WAIT:      CMP     BYTE PTR [BUSY],TRUE    ;DON'T ALLOW A NEW SONG
                JE      PLAY_WAIT               ;WHILE THE OLD ONE IS
                                                ;PLAYING
                MOV     DX,[BP+A_OFF]

                MOV     WORD PTR [MUSIC],DX
                MOV     BYTE PTR [DURAT],WHOLE_TIME / 4
                MOV     BYTE PTR [PLAYON],FALSE
                MOV     BYTE PTR [COUNT],0
                MOV     BYTE PTR [OCTAVE],1

                CALL    GRAB_VECTOR
                POP     BP
                RET

PLAY            ENDP

;THIS ROUTINE SCANS A STRING FOR MUSIC, STRING IS IN [MUSIC]
;RETURNS AX = 1 FOR GOOD STRING, 0 FOR ABORTED
PLAYIT: MOV     SI,WORD PTR [MUSIC]             ;GET CURRENT POINTER

                MOV     AL,BYTE PTR [SI]        ;GET CURRENT BYTE
                PUSH    SI
                MOV     SI,OFFSET VALID_STRING  ;SEE IF IT'S A LEGAL
                CALL    INSTR                   ;MUSIC COMMAND
                POP     SI
                CMP     AX,0                    ;IF SO...
                JNE     PLAY2                   ;GO PROCESS IT

ERRORPLAY:      CALL    SOUND_OFF               ;ELSE, GIVE UP AND
                CALL    UNGRAB_VECTOR           ;GO HOME
                RET
```

```
PLAY2:  CMP   BYTE PTR [SI],'R'      ;SEE IF IT'S A REST
        JNE   PLAY3                  ;IF NOT, TRY OTHERS

        MOV   AX,WORD PTR [DURAT]    ;GET THE CURRENT TIME
        MOV   BYTE PTR [COUNT],AL    ;SET IT IN THE COUNT
        MOV   BYTE PTR [PLAYON],TRUE ;START COUNT DOWN
        JMP   ENDPLAY                ;AND WE'RE PARTYING

PLAY3:  CMP   BYTE PTR [SI],'O'      ;CHECK FOR OCTAVE MARK
        JNE   PLAY4                  ;IF NOT, TRY OTHERS

        MOV   AL,BYTE PTR [SI+1]     ;GET OCTAVE ARGUMENT
        PUSH  SI
        MOV   SI,OFFSET OCTAVE_STRING ;SEE IF IT'S IN THE
        CALL  INSTR                  ;STRING OF LEGAL ARGS
        POP   SI
        CMP   AX,0                   ;IF SO
        JNE   PLAY3A                 ;PROCESS IT
        JMP   ERRORPLAY              ;ELSE GET LOST

PLAY3A: MOV   BYTE PTR [OCTAVE],AL   ;SAVE IT
        MOV   BYTE PTR [PLAYON],FALSE ;SAY WE AREN'T PLAYING
        JMP   ENDPLAY

PLAY4:  CMP   BYTE PTR [SI],'L'      ;CHECK FOR LENGTH
        JNE   PLAY5                  ;IF NOT, TRY OTHERS

        MOV   AL,BYTE PTR [SI+1]     ;GET ARGUMENT
        PUSH  SI
        MOV   SI,OFFSET DURAT_STRING ;IS IT LEGAL?
        CALL  INSTR
        POP   SI
        CMP   AX,0                   ;IF SO
        JNE   PLAY4A                 ;PROCESS IT
        JMP   ERRORPLAY              ;ELSE, SCOOT

PLAY4A: MOV   CL,AL                  ;GET TRUE LENGTH VALUE
        DEC   CL
        MOV   AX,1                   ;GET POWER OF TWO...
        SHL   AX,CL                  ;DIVISOR
        MOV   CX,AX
        MOV   AX,WHOLE_TIME          ;DERIVE FRACTION OF...
        DIV   CL                     ;WHOLE NOTE TIME

        MOV   BYTE PTR [DURAT],AL    ;SAVE IT
        MOV   BYTE PTR [PLAYON],FALSE ;SAY WE AREN'T PLAYING
        JMP   ENDPLAY

PLAY5:  MOV   AL,BYTE PTR [SI]       ;MUST BE A NOTE VALUE
        CMP   BYTE PTR [SI+1],'#'    ;CHECK FOR A SHARP
        JNE   PLAY5A                 ;IF IT IS, SET HIGH BIT
        OR    AL,80H
PLAY5A: PUSH  SI
        MOV   SI,OFFSET NOTE_STRING  ;GET INDEX INTO NOTE
        CALL  INSTR                  ;TABLE
        POP   SI
        CMP   AX,0
        JNE   PLAY5B
        JMP   ERRORPLAY

PLAY5B: DEC   AX                     ;GET TRUE INDEX
        SHL   AX,1                   ;TIMES 2 FOR WORDS

        PUSH  AX
        MOV   AX,24                  ;NUMBER OF WORDS IN OCT
        MOV   CL,BYTE PTR [OCTAVE]   ;GET OCTAVE NUMBER
        DEC   CL                     ;GET TRUE OFFSET
        MUL   CL                     ;GET OFFSET INTO TABLE
        MOV   CX,AX
        POP   AX
        ADD   AX,CX                  ;ADD TO INDEX
        PUSH  SI
        MOV   SI,OFFSET TONES        ;POINT TO THE TABLE
        ADD   SI,AX                  ;PLUS THE INDEX
        MOV   AX,WORD PTR [SI]       ;GET THE NOTE VALUE
        MOV   WORD PTR [PITCH],AX    ;SAVE IT IN [PITCH]
        CALL  SOUND_ON               ;TURN ON THE NOTE
        POP   SI                     ;[PLAYON] IS NOW TRUE

ENDPLAY: INC  SI
        INC   WORD PTR [MUSIC]
        CMP   BYTE PTR [SI],0        ;CHECK FOR STRING END
        JE    ENDSONG
        CMP   BYTE PTR [SI],SEP      ;CHECK FOR SEPARATOR
        JE    NEXTNOTE
        JMP   ENDPLAY

NEXTNOTE: INC WORD PTR [MUSIC]
        CMP   BYTE PTR [PLAYON],FALSE ;IF LAST EVENT WASN'T
        JNE   NEXTNOTE1              ;NOTE OR REST, LET'S GO
        JMP   PLAYIT                 ;DO ANOTHER ONE

NEXTNOTE1: RET                       ;ELSE WE'RE DONE

ENDSONG: CALL SOUND_OFF              ;KILL STRAY NOTES
        CALL  UNGRAB_VECTOR          ;RESTORE VECTOR
        RET

;THIS ROUTINE RETURNS POSITION OF CHARACTER IN AL IN STRING IN BX
;0 IF NOT FOUND
INSTR:  PUSH  SI                     ;SAVE THE POINTER
        PUSH  CX
        MOV   CX,1                   ;INDICATE FIRST HARACTER

INSTR1: CMP   BYTE PTR [SI],0        ;ARE WE AT END OF STRING?
        JNE   INSTR2
        SUB   AX,AX                  ;IF SO, SAY NOT FOUND
        POP   CX
        POP   SI                     ;RESTORE REGS
        RET                          ;AND GO

INSTR2: CMP   AL,BYTE PTR [SI]       ;IS IT A MATCH?
        JNE   INSTR3
        MOV   AX,CX                  ;IF SO, SAY WHERE IT IS
        POP   CX
        POP   SI                     ;RESTORE REGS
        RET                          ;AND GO

INSTR3: INC   SI                     ;OTHERWISE, CHANGE POINTER
        INC   CX
        JMP   INSTR1                 ;AND GO AGAIN

;THIS ROUTINE SAVES THE OLD VECTOR AND INSTALLS THE NEW ONE
GRAB_VECTOR: CLI                     ;DISALLOW INTERUPTS
        PUSH  ES
        MOV   AH,35H
        MOV   AL,TRAP_NUMBER
        INT   21H                    ;GET EXISTING VECTOR
        MOV   [VECTOR_OFFSET],BX     ;SAVE VECTOR IN CODE
        MOV   [VECTOR_SEGMENT],ES
        POP   ES

        PUSH  DS
        MOV   AH,25H
        MOV   AL,TRAP_NUMBER
        PUSH  CS
        POP   DS
        MOV   DX,OFFSET COUNTDOWN
        INT   21H                    ;INSTALL HOOK INTO
        POP   DS                     ;LOW MEMORY VECTOR TABLE
        STI
        MOV   BYTE PTR [BUSY],TRUE   ;SAY THAT A SONG IS PLAYING
        RET

;THIS ROUTINE RESTORES THE ORIGINAL VECTOR
UNGRAB_VECTOR: PUSH  DS
```

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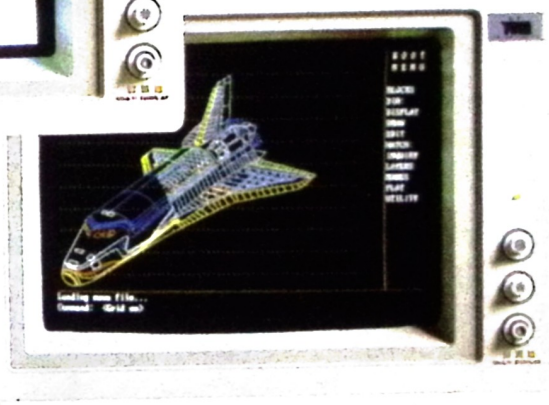

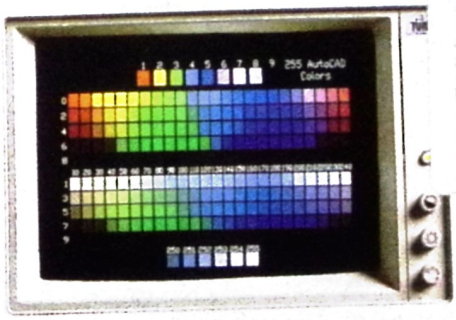

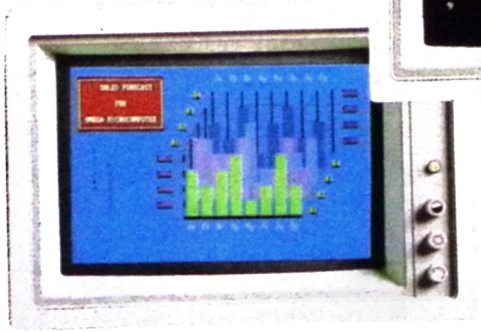

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```
        MOV     AH,25H
        MOV     AL,TRAP_NUMBER
        MOV     DX,WORD PTR [VECTOR_OFFSET]
        MOV     DS,WORD PTR [VECTOR_SEGMENT]
        INT     21H                     ;INSTALL HOOK INTO
        POP     DS                      ;LOW MEMORY VECTOR TABLE
        STI
        MOV     BYTE PTR [BUSY],FALSE   ;SAY THAT NO SONG IS PLAYING
        RET

;THIS ROUTINE TURNS ON THE SOUND
SOUND_ON:       MOV     AL,BYTE PTR [DURAT]
                MOV     BYTE PTR [COUNT],AL
                IN      AL,61H
                OR      AL,3
                OUT     61H,AL
                MOV     AL,10110110B
                OUT     43H,AL
                MOV     AX,WORD PTR [PITCH]
                OUT     42H,AL
                MOV     AL,AH
                OUT     42H,AL
                MOV     BYTE PTR [PLAYON],TRUE
                RET

;THIS ROUTINE TURNS OFF THE CURRENT SOUND
SOUND_OFF:      IN      AL,61H
                AND     AL,11111100B
                OUT     61H,AL
                MOV     BYTE PTR [PLAYON],FALSE
                RET
;THIS IS THE INT 1CH ISR HANDLER THAT COUNTS DOWN THE NOTE DURATIONS
COUNTDOWN:      PUSH    AX
```

```
                PUSH    BX
                PUSH    CX
                PUSH    DX
                PUSH    SI

                PUSH    DS                      ;SAVE EVERYTHING

                MOV     AX,DATA
                MOV     DS,AX                   ;SET UP DATA SEGMENT

                CMP     BYTE PTR [PLAYON],TRUE
                JNE     COUNTDOWN1              ;SEE IF WE'RE PLAYING

                DEC     BYTE PTR [COUNT]
                CMP     BYTE PTR [COUNT],0      ;IF SO, COUNT DOWN
                                                ;SEE IF WE'RE AT ZERO
                JNE     COUNTDOWN2
                CALL    SOUND_OFF
                JMP     COUNTDOWN2              ;IF SO, SOUND OFF

COUNTDOWN1:     CALL    PLAYIT

                                                ;IF NOT PLAYING
COUNTDOWN2:     POP     DS                      ;GET NEXT EVENT
                POP     SI

                POP     DX
                POP     CX
                POP     BX
                POP     AX
                IRET                            ;RESTORE EVERYTHING
                                                ;AND RETURN FROM INT
PROG            ENDS
                END
```

the sound off if it has. As such, we would load COUNT with a value, turn on the sound and consider the foreground part of the problem done. The computer could now go on to do something else. The timer tick interrupt handler would decrement the COUNT value eighteen times. When it got to be zero, it would call SOUND_OFF, and the speaker would shut up. By this time the foreground task of the computer could have gotten onto something else.

We've succeeded in generating a note without a timing loop. In fact, it does suck away a very tiny bit of processor overhead to handle the decrementing of COUNT, but this is negligible. The note will play without affecting the program that called for it.

The Sound Of Music

In order to make this thing practical, it must be possible to pass the as yet mysterious music playing function a string of note values... a song... and have it interpret and play them as a background task. While these could be cryptic divisor values, it's much more convenient to come up with a tiny music playing language... something along the lines of the music language in BASIC.

The primitives of the language are simple. The letters A through G are notes, naturally enough. A note followed by a sharp will play the sharped value of the note, except for B and E, which don't have sharps *per se*. The letter R is a reset.

The letter L indicates a change in the length, or duration, of a note. It must be followed by a legal duration argument. These are

```
1       whole note
2       half note
4       quarter note
8       eighth note
6       sixteenth note
```

A whole note is defined as being twenty-four 1CH interrupt hits, or something more than a second long.

Having set the duration, all the subsequent notes and rests will be of that duration until the next L is encountered.

The letter O... that's as opposed to the number zero... is the octave mark. It changes the octave for all the subsequent notes, and must be followed by a legal octave argument, that is, a number from one to five. Octave one has its A note two octaves below middle C, or at a hundred and ten hertz.

Each command, or event, in a string of music must be separated by a vertical rule character. You can change this in the source file if you want to. The string must be terminated by a null byte, and can be as long as you want it to be.

Because this thing runs as a background task, it can't really be expected to be terribly interactive. As such, if it encounters a syntax error in the music string it's passed it stops playing. This won't hang the program or anything quite so nasty... it will just pretend that it reached the end of the song a bit early. One common sort of error... at least, one which I made frequently when I was writing this... was to use zeros for octave marks.

The C program that calls this code passes it a pointer to a string of music. You can see a typical string and a call to *play( )* in the example code later on. The interpreter stores the pointer in the MUSIC location and "grabs" the 1CH vector.

In grabbing the vector, the code copies its old vector value into a buffer and installs a new vector in the page zero vector table to point this interrupt to the COUNTDOWN routine. Then it returns to the C program that called it, essentially finished.

Upon the next 1CH interrupt, COUNTDOWN will discover that PLAYON is set FALSE, which means that nothing is being played. It accepts this as a signal to interpret the first byte of the music string. The first two commands in a music string should set the octave and duration values. The third command will usually be a note or a rest, that is, something which takes a reasonably long stretch of time to execute.

In playing a note, the interpreter code, PLAYIT, will call SOUND_ON to turn on the counter timer chip, load the COUNT value with the current duration value and quit. The 1CH interrupt will return through an IRET.

On subsequent hits of the interrupt, COUNT will be decremented until it reaches zero, at which point COUNTDOWN will turn off the sound and go on to fetch the next instruction in the music string.

When COUNTDOWN encounters a zero byte... the end of the string... or an error, it shuts off the sound with

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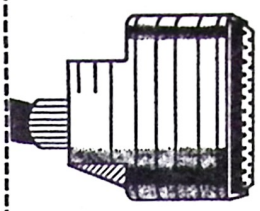

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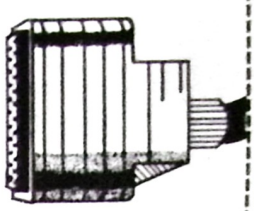

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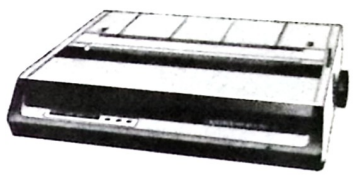

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SOUND_OFF... just in case it has been left on for some reason... and "ungrabs" the 1CH interrupt vector. In other words, it restores the original vector, so that the interrupt is again executing the IRET instruction in the BIOS.

Once the initial call to *play( )* is done, the rest of the operation executes transparently to the calling program.

Practical Tunes

There are a few things to bear in mind about this code. The first concerns the strings that are passed to it. It is highly nasty indeed to pass this thing a pointer to a string which might get deallocated and overwritten before the music has stopped playing. The *play( )* function does not copy the string... it merely stores a pointer to it.

It's a good idea to create a permanent global music string buffer with *malloc( )*, copy your music into it and pass *play( )* a pointer to it, rather than to your music. As long as you take care not to change the contents of the buffer before the music is done, you'll be laughing. Of course, it's hard for one's program to know when the music is finished.

There are two smaller functions in the assembly language file which allow one to deal with the after effects of a call to *play( )*. The first one, *play_busy( )*, returns the status of the BUSY flag. It will return a true value so long as the music is playing. Thus, this

```
while(play_busy( ));
```

will cause the computer to wait until the current music is done. In fact, the *play( )* routine executes the equivalent of this whenever it's asked to start playing a tune, as having it begin a new tune before an old one is done is highly disastrous.

The other useful function is *shut_up( )*, which will kill the current song, that is, force an error condition so that *play( )* ungrabs the vector and shuts down the noise. You would just execute

```
shut_up( );
```

It doesn't take any arguments, and doesn't return anything.

If there's any chance at all that music might still be playing when your program returns to DOS, you must either wait for *play_busy( )* to be false or execute *shut_up( )*. If the music is still going... that is, if the 1CH vector is still pointing into your code... when a new program loads into memory, the COUNTDOWN interrupt handler will be overwritten and the machine will jump into some part of your new program... most likely hanging it.

To use this thing, type in the source code in this feature. I called it PLAYSONG.ASM. Assemble this with MASM... to get PLAYSONG.OBJ... but don't link it. Type in the example C program, compile it and link it to PLAYSONG. The linking line would be something like

```
LINK C + PLAYSONG + MUSIC
```

assuming that you called the C program MUSIC.C. Presumably you'll want to create a batch file to handle this automatically.

This would leave you with MUSIC.EXE. The sample source file will play a hornpipe.

This code was written to work with Lattice C. It also works with Datalight C, and should be fairly happy with any PC C compiler which uses the standard Microsoft linker conventions.

I haven't been particularly responsible about the way that the interrupt handler uses the stack, inasmuch as it doesn't require much stack overhead. If you're writing a large program which has lots of nested functions, or one that passes huge numbers of arguments, it would be a good idea to increase the size of the default stack to make sure that the interrupt handler doesn't overwrite something and crash.

Encore

Far from simply being a mild amusement, the music playing function can make even "serious" software a lot more user friendly. It can be used to sound alarms, or make comforting noises when something is supposed to be happening. Programs which seem to go dead for long periods of time are disturbing, as one never knows if the system is busy or hung.

To this end, you might want to code up a few canned tunes for specific instances. For example, "Ride of the Valkyries" is good for loading large overlays. You might want to have Handal's "Music for the Royal Fireworks" on hand to signal disk crashes, or a few Bach inventions for long recalculations. Any number of short tunes can signal common system problems... Elgar's "Pomp and Circumstance March" seems singularly appropriate for either full disks or software that will only run on a real PC.

Being limited to a single voice, of course, this thing is a bit restricted to catchy, recognizable tunes. I've yet to get convincing Grateful Dead out of it. **CN!**

```
/* ************************************************

        Music demo program - link to PLAYSONG.OBJ

        this code illustrates the use of play(),
        play_busy() and shut_up(). Plays a hornpipe.

        for Lattice C

        copyright (c) 1987 steve rimmer

   ************************************************ */

#include        "stdio.h"

main()
{
        char *p,*malloc();

        /* allocate a big buffer and copy the music to it */
        if((p = malloc(2048)) != 0) {
                strcpy(p,"L6!O3!C!B!C!R!O2!L8!C!C!L6!");
                strcat(p,"G!F!E!G!O3!L8!C!L6!C!E!D!C!");
                strcat(p,"D!R!O2!L8!D!D!L6!D!C!B!D!L8!");
                strcat(p,"G!G!O3!L6!A!B!C!B!A!O2!G!O3!");
                strcat(p,"A!O2!G!F!E!F!E!D!C!D!C!B!A!");
                strcat(p,"O1!G!O2!A!B!C!D!E!F!G!E!R!L8!C!C!");

                /* tell the code to play the music */
                play(p);

                /* this bit will wait until either the music is
                   finished or a key is hit, in which case it
                   will shut the song up early */
                while(play_busy()) {
                        if(bdos(11)) {
                                shut_up();
                        }
                }
        }
        else {
                /* malloc error */
                puts("Oh no... it's the memory mice");
        }
}
```

COMPUTER PRESS

Continued from page 7

Laser Goodies

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Laser Control is a software package which provides compatibility for IBM PC software not originally designed for QMS printers. Designed for the H-P LaserJet, it is of course fully compatible with all QMS printers, and will be priced at $285.

A user-installable upgrade, PS Jet from *The Laser Connection* converts Hewlett-Packard, QMS, and Canon laser printers to Adobe PostScript-based desktop publishing systems. With 2.5 megabytes of memory and a full implementation of PostScript, it costs of $4,895.

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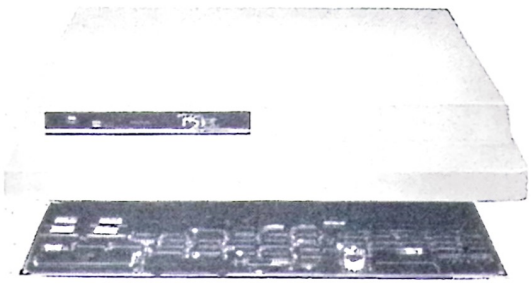

Continued on page 78

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by Marie Hubbs

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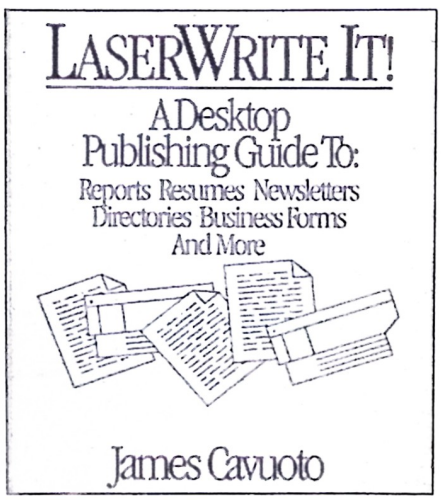

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● Two reference books from The Waite Group are now available from Sams, both for a price of $16.95 US.

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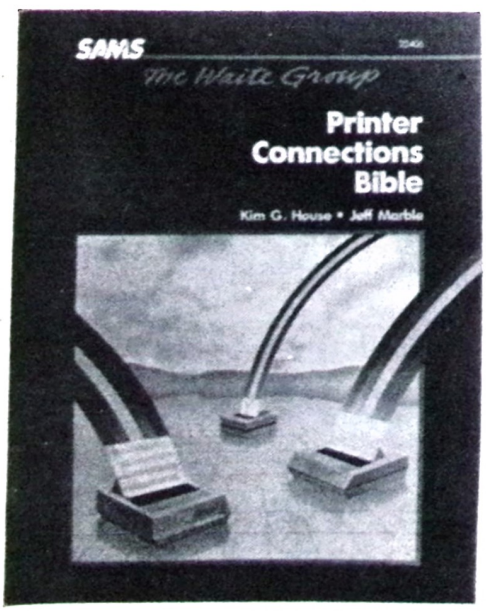
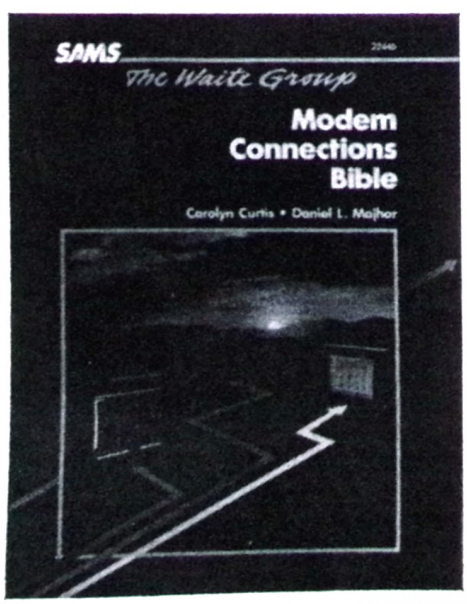
The *Modem Connections Bible* by Curtis and Majhor also focuses on the interfacing between modem and computer.





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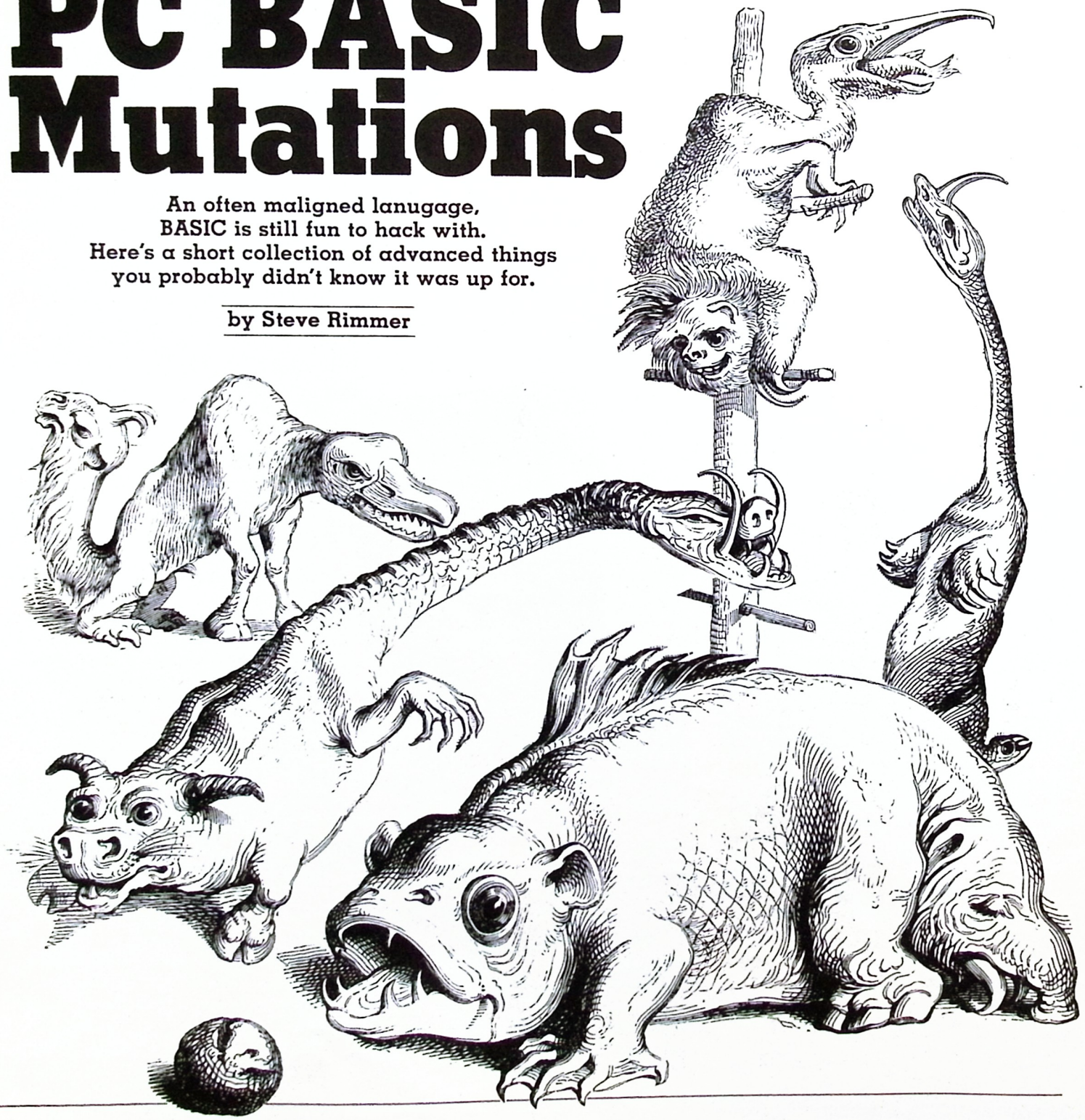
Half A Dozen PC BASIC Mutations

An often maligned lanugage, BASIC is still fun to hack with. Here's a short collection of advanced things you probably didn't know it was up for.

by Steve Rimmer



Half A Dozen PC BASIC Mutations

Unlike some of the more enlightened languages... you might want to read "nasty" instead of "enlightened" in this case... BASIC is a rather finite programming environment. It abhors the very notion of extensions to itself, and, if its designers haven't put some feature you need into it, you're usually fairly stuck.

There are a few limited approaches to doing clever things with BASIC... the freakiest of which is usually adding machine language to it. Most of the time, one expends more effort on the implementation of such tricks than one does on the tricks themselves.

When one finally does manage to cheat on BASIC a bit, however, it feels really good. This feature is about a number of simple hacks... tricks you can play on the PC from within BASIC that the manuals don't talk about. In fact, with most of them you can expand what I've gotten into here into specialized cheats of your own.

INs And OUTs

The PC is based on a "port driven" processor, the 8088. This port driven effort means that when the PC wants to communicate with the outside world, it usually does so by executing special machine language instructions that transfer data to and from its ports. A port is just what it sounds like it might be, a sort of virtual hole in the side of the computer through which numbers can pass.

The serial communications, printer I/O, the keyboard... all of this stuff wanders its way through the PC's ports. A lot of communication between the motherboard and the expansion cards happens through ports as well. There are several good reasons for this, not the least of which is that communicating through ports saves the system from having to tie up its memory for low level byte fiddling.

In a rare effort of foresight, BASIC was written with port handling commands. These are INP, a function to return the value in a port, and OUT, which sends its argument out to a specified port.

The first few tricks we're going to look at here involve meddling with the numbers that drive the 6845 video controller chip of the PC. This is hard wired to a range of ports. While one usually needn't play with it to make the screen work, one can do some peculiar things to the screen if one knows what it's about.

Actually, the 6845 could be the topic of an article all by itself. Here's a quick look at a few of the simpler facilities it provides.

The following is an interesting, although useless, program.

```
10 FOR A = 90 TO 0  STEP -1
20      OUT 980,2
30      OUT 981,A
40      FOR Y=1 TO 20  : NEXT Y
50 NEXT
60 OUT 980,2
70 OUT 981,90
80 END
```

This thing runs on a colour card, and, when it gets going, it will scroll the screen to the right. In fact, it will wrap the screen all the way around, or nearly so, and then put it back again. It does it very, very quickly with no snow at all.

This code works by altering the horizontal position register of the 6845, which is intended to be used to centre the screen image on one's tube. The usual value of this register is ninety, which represents a properly centred image. If you decrease it, as I've done here, the screen will shift. In fact, there's no data moving around... the contents of the screen memory aren't being affected. The hardware is moving the image all by itself, which accounts for its speed. The 8088 could never do anything this quickly.

Here's another... slightly more productive... use of the 6845's hardware. Again, this only works on the colour card. This will store up to four pages of screen stuff and flip between them instantaneously. Oddly enough, this really slick feature is supported in BASIC. Unfortunately, they just don't tell you about it.

```
10 SCREEN ,,5,4
15 CLS
20 PRINT "A politician is a man who, upon discovering that"
30 PRINT "roses smell nicer than onions, would also conclude"
40 PRINT "that they make better soup."
50 SCREEN ,,6,4
60 CLS
70 PRINT "A man without a god is like a fish without a bicycle"
80 SCREEN ,,7,4
90 CLS
100 PRINT "Reality is a crutch for people who can't face drugs."
110 SCREEN ,,4,4
120 CLS
130 PRINT "Use the arrow keys to change the pages"
140 A$ = "" : P = 5
150 WHILE A$ <> CHR$(13)
160     A$ = ""
170     WHILE A$ = ""
180             A$ = INKEY$
190     WEND
200     IF A$ = CHR$(0) + CHR$(72) AND P > 5 THEN P = P - 1
210     IF A$ = CHR$(0) + CHR$(80) AND P < 7 THEN P = P + 1
220     SCREEN ,,P,P
230 WEND
240 SCREEN ,,4,4
250 END
```

This program will let you flip between three arguable truths faster than you'd have imagined the PC's screen could move, once again, all without a vestige of snow.

The SCREEN command usually only has one argument, that is, the screen mode you want to put the PC in. It will actually accept three more. The third one is the currently displayed page, while the last one is the page to PRINT to... not necessarily the same thing.

The PC's colour card has sixteen kilobytes of memory for its screen buffer. In text mode, only four kilobytes are needed for a full screen of characters, which means that the buffer has room for four pages in there.

You can tell the PC which of the four pages to display on its tube by manipulating its display hardware. Fortunately we don't have to handle the manipulation itself, as BASIC does actually have the ability to prod at the right chips and ports to get this together for us. Having told the system to change the visual page number, the screen's contents will appear to change with unheard of speed. Actually, they're doing no such thing... the screen is just looking at a different part of memory.

BASIC, for reasons best left as being mysterious, labels the pages four through seven. Thus, SCREEN ,,4,4 selects the primary page... the usual one... for both writing to and looking at. However, this bit of code

```
SCREEN ,,5,4
PRINT "Llamas in spring"
```

would show you the primary page while writing to the second page, page five. A subsequent

```
SCREEN ,,,5
```

would switch the screen to the second page. Once again, this is a hardware change, rather than any data manipulation, so the change is really instantaneous, faster than anything one can do by altering the screen buffer contents.

This trick can be used in several ways. If you have a number of screens in a program that you want to bring up at various times, you can PRINT them into the invisible screen memory when the program starts and then swap the screen pages as you need them. It looks impressively slick. Another approach is to create the screens with whatever you want to create them with...

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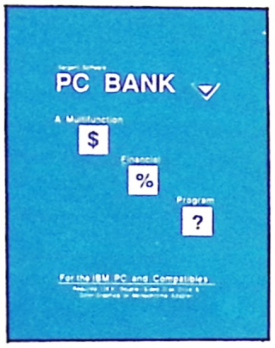

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BASIC, or a word processor and a text screen grabber program... and then BLOAD them into the hidden pages. If you are looking at the primary screen, the first hidden page is at offset &H800 in the screen buffer segment &HB800.

You can easily modify the graphics grabber program in this issue to grab text screens for later BLOADing, by the way. Just make the screen size 0800H.

Here's another bit of 6845 register fiddling.

```
10 DEF SEG = 64
20 OUT (PEEK(99) + (256 * PEEK(100)) + 4),(PEEK(101) AND 247)
30 BEEP
40 A$ = INPUT$(1)
50 OUT (PEEK(99) + (256 * PEEK(100))) + 4,PEEK(101)
```

If you type this in and run it, your screen will go blank and the speaker will toot, the latter manifestation being the result of the BEEP statement in line thirty. Hit any key and the screen will come back. This is the usual way to effect a blank screen without actually destroying the contents of it. It effectively turns off the 6845's output. It's the basis for memory resident screen saver programs, among other things. It can be useful if you want to incorporate a screen saver in a large BASIC application.

Out Of Control

If you use the same word processor a lot... I use WordStar quite a bit... and then leap into BASIC for a bit of mindless byte slaughter, you may have experienced some screen oddities should you have inadvertently tried to use a control key to edit your program text. Most of the time one moves around the BASIC line editor with the arrow keys, but, in fact, there is a weird control key interpreter built in there too, probably a left over from the days of eight bit systems.

Here's a list of the more useful control keys and what they do.

```
Control W       Deletes the word right of the cursor.
Control E       Deletes the line right of the cursor.
Control R       Toggles the insert mode.
Control T       Toggles the key lables on and off.
Control U       Deletes the line the cursor is on.
Control F       Moves right one word.
Control J       Opens a blank line below the cursor.
Control K       Homes the cursor.
Control L       Clears the tube.
Control X       Scrolls the text backwards a line.
Control Z       Delete to the end of the screen.
Control B       Moves left one word.
Control N       Moves to the end of the line.
```

Now, you may not have much use for these in editing BASIC text. Many of them have extended key alternatives that most programmers will have long since gotten used to. However, some of them do work if you PRINT them while a program is running. For example, you can clear the screen by doing

```
PRINT CHR$(12);
```

The ASCII value of control L is twelve. The useful ones that work in my version of BASIC are control E,K and L. Sadly, control Z does not... a drag, this, as being able to delete to the end of the screen fairly painlessly is often useful.

If you have ANSI.SYS installed in your system... or better still, the NANSI.SYS driver from our almost free PC software disk number twenty-one... you'll be able to get the delete to end of screen function happening in other ways.

The real terror of BASIC is in trying to integrate machine language subroutines with it. Most programmers get into other languages at about this time. BASIC's machine language interface is dreadful under the best conditions.

It is possible to get into some simple machine language from BASIC without the use of heavy sedation. While a bit tedious to program if you want to use a machine language routine to calculate fast Fourier transforms or something equally involved, this approach works well if you feel like accessing the DOS interrupt calls or handling other simple tasks.

There are all sorts of things which machine language programmers take for granted that BASIC can't handle. This is because BASIC doesn't allow you to get at all the DOS services and other things that the PC offers at its street level. In order to be able to make these things go, BASIC would have to allow you a way to meddle with the 8088's registers and throw interrupts... which it has no intention of doing. Machine language, if handled improperly, tends to crash the system, something which BASIC dislikes.

The next two programs we're going to look at share this aspect of pure assembly language, by the way. Save 'em *before* you run 'em... if it turns out that you've committed errors in entering them you probably won't get a chance to afterwards.

A machine language program is just a string of op codes and data which, in a still simpler sense, is just a string of bytes. Structurally, then, a machine language program and a BASIC string variable are sort of the same. Load up a string with the right bytes, devise some way for the 8088 to jump to them and you'll have a useable machine language subroutine in BASIC.

There are several limitations to this. A machine language program can't be longer than two hundred and fifty-five bytes if it's to be handled this way, as this is the maximum length of a string under BASIC. Because the location of a string in memory can vary a lot under BASIC, absolute locations within the subroutine are a bit difficult to ascertain. Relative jumps are cool... calls to subroutines from the main subroutine are not, or, at best, will take some stealth to arrange. Fortunately, there's no reason to use sub-subroutines just to implement a few DOS calls.

There are a few other useful things to know about machine language under BASIC. The strings will be in the PC's data seg-

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ment...both the machine language strings and any other strings you need. As such, when one wants to pass the offset of a string to the operating system, one can simply use the offset returned by BASIC with the VARPTR function. We'll get to this momentarily.

You must preserve the value of the BP register through a machine language subroutine call. You must also do a far return when it's done with, a RETF rather than a RET.

Here's a really simple example of a machine language subroutine in BASIC. This little program prints a string using the DOS INT 21H, function nine call.

```
10 S$ = "There once was a hermit named Dave"
20 GOSUB 50
30 PRINT
40 END
50 'PRINT S$ USING DOS PRINT CALL
60 A$ = S$ + "$"
70 P = VARPTR(A$)
80 M$ = CHR$(&H55) + CHR$(&HB4) + CHR$(&H9) + CHR$(&HBA)
90 '     PUSH BP       MOV AH         ,9          MOV DX
100 M$ = M$ + CHR$(PEEK(P+1)) + CHR$(PEEK(P+2))
110 '    ADDRESS OF THE START OF THE STRING
120 M$ = M$ + CHR$(&HCD) + CHR$(&H21) + CHR$(&H5D) + CHR$(&HCB)
130 '          INT           21H           POP BP        RETF
140 L = VARPTR(M$) + 1 : C = PEEK(L) + 256 * PEEK(L+1)
150 CALL C
160 RETURN
```

The construction of M$ is where most of the work is done. In order to get this together you have to know the byte values of the op codes you want to use. I usually find 'em by assembling the machine language part of the program with DEBUG and writing down the bytes in question. Notice that we save BP by pushing it into the stack and popping it off after the interrupt has returned.

The offset of the string to print, A$, is, of course, unknown at the time of writing the program. It has to be calculated dynamically which, in turn, means that we have to know something about the way in which BASIC stores its data. The function VARPTR purports to return the addresses of variables stored in memory but, in fact, it really only returns the address of the appropriate string descriptors. To make matters funkier still, the string descriptor changes its nature slightly when we go from the BASIC interpreter to the BASIC compiler. This program is designed to work under the interpreter... it will crash most colourfully if it's compiled.

The number returned by VARPTR when it's asked to locate a string variable is the address of a byte which contains the length of the string in question. The next two bytes are the actual address. Thus, this expression

```
PEEK(VARPTR(A$)+1) + 256 * PEEK(VARPTR(A$)+2)
```

will return the address of the actual start of the string data. If the first byte of the string is the first byte of a machine language program, CALLing this value will execute the program.

In creating this program, we have to load the DX register with the offset of the string to print, A$. This can be found in the same way, although, as the address has to be spread over two bytes anyway, there's no need to convert it into an integer. You can see it happen in line one hundred.

Unlike BASIC, this DOS function will print a string of any length. It knows where the end of the string is by looking for a dollar sign. If you neglect to append a dollar sign to the string, it will probably print half your computer for you until it happens upon one. Unlike BASIC, machine language programs can't always be interrupted with the break key... and, if they do decide to return control of the system to you, they'll drop you back into DOS.

This next program does something you can't do under BASIC. It returns a string which contains the current directory path.

```
10 GOSUB 40
20 PRINT S$
30 END
40 'PRINT S$ USING DOS PRINT CALL
50 A$ = SPACE$(255)
60 P = VARPTR(A$)
70 M$ = CHR$(&H55) + CHR$(&HB4) + CHR$(&H47) + CHR$(&HBE)
80 '     PUSH BP       MOV AH         ,47H         MOV SI
90 M$ = M$ + CHR$(PEEK(P+1)) + CHR$(PEEK(P+2)) + CHR$(&HB2)
   + CHR$(0)
100 '    ADDRESS OF THE START OF THE STRING        MOV DL       0
110 M$ = M$ + CHR$(&HCD) + CHR$(&H21) + CHR$(&H5D) + CHR$(&HCB)
120 '          INT           21H           POP BP        RETF
130 L = VARPTR(M$) + 1 : C = PEEK(L) + 256 * PEEK(L+1)
140 CALL C
150 S$ = LEFT$(A$,INSTR(A$,CHR$(0)))
160 RETURN
```

This is, of course, similar to the last machine language program. They're all set up pretty well the same. In this case, the SI register must be pointed to a string of at least sixty-four bytes in length. After the interrupt call, the string will be found to contain the text of the current directory path... in a somewhat inconvenient form.

When DOS manages strings... most of the time, anyway... it simply lashes a bunch of bytes together with a zero at the end. There's no string descriptor involved. As such, one must have a bit of code such as the stuff in line one fifty here to copy the valid part of the string out of the buffer and make it into a meaningful BASIC string.

Assuming that you aren't in the root directory of your system, S$ will contain a valid DOS path. The one I saw when I ran it was

```
PROGRAM\BASIC\LLAMA
```

There are a few other useful things to concern yourself over in playing with machine language from BASIC. It's easiest to pass things back and forth between BASIC and assembly language in strings. You can create an empty string of any size you need with the SPACE$ function. Don't create a dummy string by saying something like

```
A$ = "          "
```

The storage area for this string is right where it lies in your program text. If your assembly language program modifies it with a character that BASIC won't print, your program won't list properly thereafter.

Another thing to avoid is trying to modify the string descriptors. BASIC seems to get awfully upset if you try it.

If you want to play with assembly language to use the PC's DOS calls, you'll probably need at least a rudimentary understanding of assembly language programming and a list of what the interrupt functions do. There are several good books on these subjects available.

Mutations For Hire

The best source for BASIC programming tricks lies at the ends of your wrists... you just have to leap in there and hack. You can probably expand these little bits of code into other... possibly more useful... routines, depending on what you're trying to write.

While human beings are probably not capable of giving BASIC a proper structure, intelligent data manipulation, useful I/O capabilities or sensible disk file commands, one can at least enhance its hardware manipulation shortcomings. It's often a lot easier than it looks once you have all the appropriate bytes spread out and helpless where you can see them.

Any mutations you can lay on BASIC are bound to be an improvement. **CN!**

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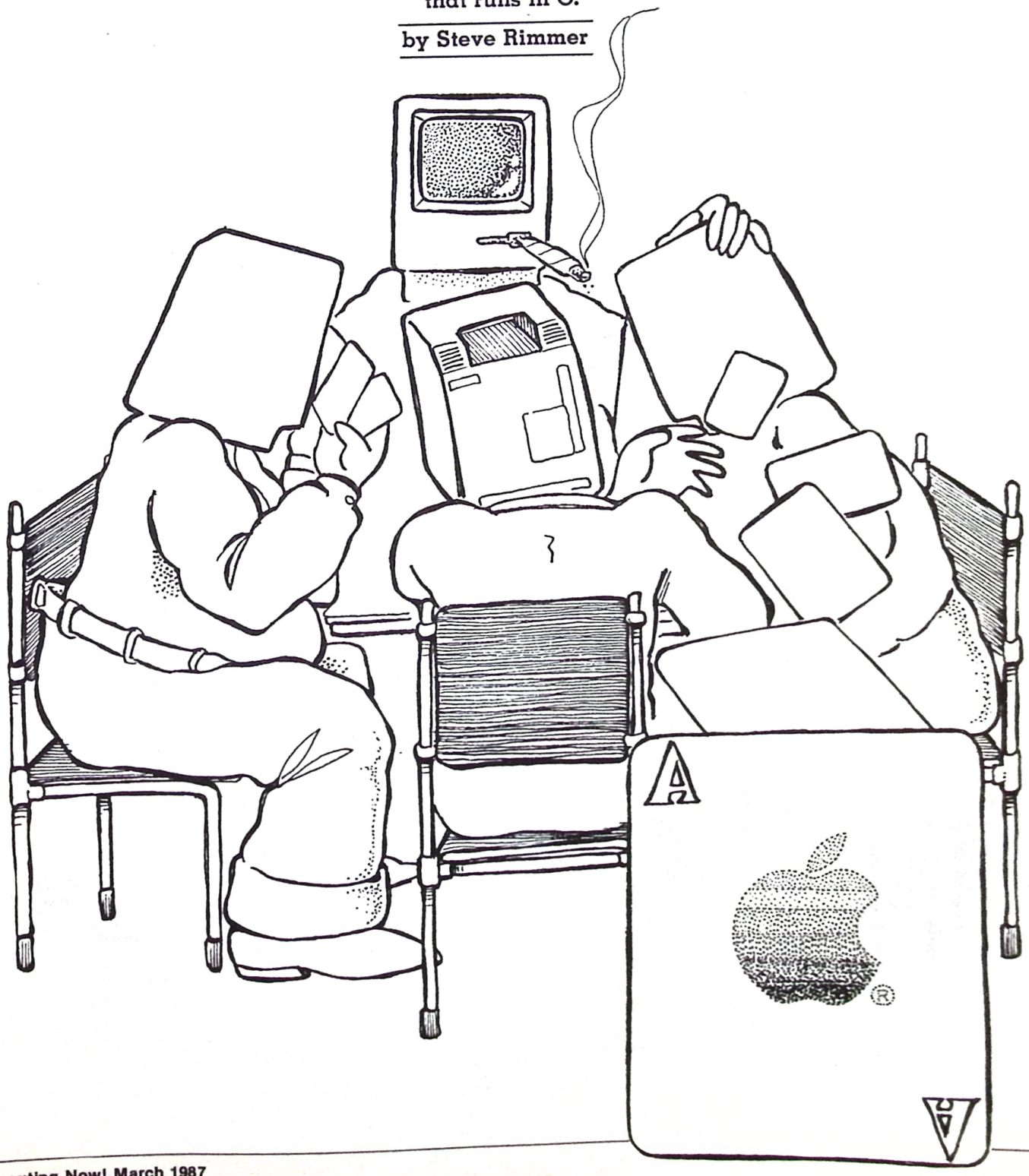
MacPoker in C

You can never have enough Macintosh games. Here's a simple version of a poker bandit machine that runs in C.

by Steve Rimmer



MacPoker in C

It's hard to decide whether writing application programs for the Macintosh is recreational or not. There are a lot of very slick things about the Mac's bizarre operating system... such as the well over four hundred system calls which do most of the low level things that one normally has to write tedious code for. On the other hand, the Mac is a painfully slow machine to waltz through the endless iterations of editing and compiling on. Even trivial code seems to take ages.

I find that Mac programming is best done in front of the tube while it's busy showing particularly funky old movies late at night. I'm partial to E.G. Wood science fiction flicks for this purpose. You'd never want to actually watch one, but they're sufficient to keep one amused while the Mac is engaged in its interminable disk accesses.

If you have a hard drive I imagine that Mac programming will take on a whole new meaning for you, and your television will get significantly dustier than mine does.

If you've read "Inside Macintosh"... and actually believe it... you'll know that you're meant to program the system in Pascal. We all have our own ideas on the ultimate cosmic relevance of Pascal. I've always been a lot more comfortable with other tools... I find C on the Mac to be a much nicer place to view the universe from. The program in this article is written in DeSmet C for the Mac... arguably not the most sophisticated compiler on the planet, but small, cheap and powerful enough for anything most of us are likely to attempt.

In this feature we're going to look at a draw poker game for the Mac. It's similar in concept to the draw poker game I wrote for the PC in the December 1986 edition of Computing Now!. In fact, it uses some of the same code. However, as we'll see, a great portion of the programming of this thing is involved in its human interface rather than in the mechanics of dealing the cards and analysing one's hand. As such, much of this program is unique to the Mac, as it has a much more comfortable user interface than does the PC.

Shut Up And Deal

This program simulates a draw poker machine, a "bandit", rather than people actually playing the game. It might be worth checking out the house rules before we get into how they're implemented.

The machine starts by dealing five cards. There are five levels of bets, from ten to fifty dollars. I decided to make this a high stakes game... if one is playing with virtual money one might as well be a heavy roller. Having dealt a hand, the bets are frozen and the machine will start looking for input. You can click any of the cards to hold them. When you click "Play" the thing will replace all the non-held cards and analyse the resulting hand for pairs, straights, flushes and so on. It pays off based on the odds of getting a particular combination of cards, and keeps track of the current state of your winnings... or losings.

There are actually a number of separate tasks involved in making this program happen. The code must handle the dealing of the cards and analysing the resultant hands. This isn't really all that involved... shuffling and dealing are easy, and the *scrutinize( )* routine that figures out what you've got is just an exercise in pattern matching. It's about the biggest chunk of code in the program, but it's fairly simple. We'll get into it in more detail shortly.

The code to display the cards and handle the interface is a bit more complex because it has to make sense of the Mac's system calls. If you're used to programming in other graphics environments, the Mac will probably be confusing. It's actually rather elegant once you make your way into it. However, you have to warp your head a bit.

The shell of this program is a standard Mac non-application. Now, I've made the poker program into a pseudo-desk accessory here... you access it with the "Poker" item in the apple menu. You can change this if you like... its window can easily be made to open up immediately upon the program's booting, or be activated from another menu.

The basic Mac non-application... a shell that just gets the system ready to do something... consists of all the stuff at the top of this listing, in the *main( )* routine, and the things at the bottom, in *init_menus( )* and *all_events( )*. This sets up the menu bar and handles any events... in our case, mouse clicks... that subsequently come down.

I've left most of the shell application intact in this code so you can see how it's supposed to work. Obviously it could have been a lot shorter, as most of the code is stubs. However, it's worth noting how the Mac likes to have its events handled. At the programming level it doesn't differentiate between mouse clicks in its various boxes and windows, keyboard events and so on. This makes coding an event handler rather pleasing, as one can devise the whole dog and pony show without a lot of funky code to trap for special cases.

By comparison, writing something to take care of a mouse and the keyboard of a PC is usually a miasma of unstructured programming at its most convoluted.

When we get to the actual poker playing code you'll note that I haven't reproduced this structure, but, rather, just used a simple loop to see what the mouse is up to. There really is only one sort of event involved in the poker routines and, as such, using a sophisticated event handler would have been a bit of overkill.

The *poker( )* function is what does all the work. Most of the time, in programming the Mac, one tends to create a sort of universal all purpose scratch *Rect* variable which gets loaded up with various values and passed to the functions that need it. In fact, since a *Rect* is only four words long, it's not a terribly gross waste of space to create lots of them, using them as a convenient way of holding various areas and parameters.

One important function in this program is *is_inrect( )*. It takes a *Rect* and *Point* and decides whether the latter lies inside the former. Thus,

```
if(is_inrect(&Rect,&Point))
```

will do whatever is inside the *if* should the point be inside the rectangle. This is, of course, useful to see if we've clicked the mouse on a card.

Actually, I've used this in several other places. There are a number of pseudo-dialogs happening here... they behave like standard Mac dialogs, but aren't done by the dialog manager. The peculiar data structure of the dialog manager is one of the few Pascal things that just doesn't translate well into C, and, as such, is very awkward to use. Because the dialog requirements of the program are pretty light... and as we have the code around to detect mouse clicks anyway... it's fairly painless to cook up hand drawn facsimiles of dialogs.

The first thing that the *poker( )* function does is to set up a whole pile of rectangles. I suppose I could have made these global variables and initialized them at the creation of the program. However, this wouldn't have resulted in any major savings in code space, and speed isn't really much of a concern here. Besides the syntax of getting them initialized became a bit lengthy... it's neater to handle them programmatically.

Having created separate *Rect* variables for all the areas in the poker window, subsequently detecting where the mouse has been clicked is pretty easy... we can just pass *is_inrect( )* the appropriate rectangle, as we'll see.

Going Straight

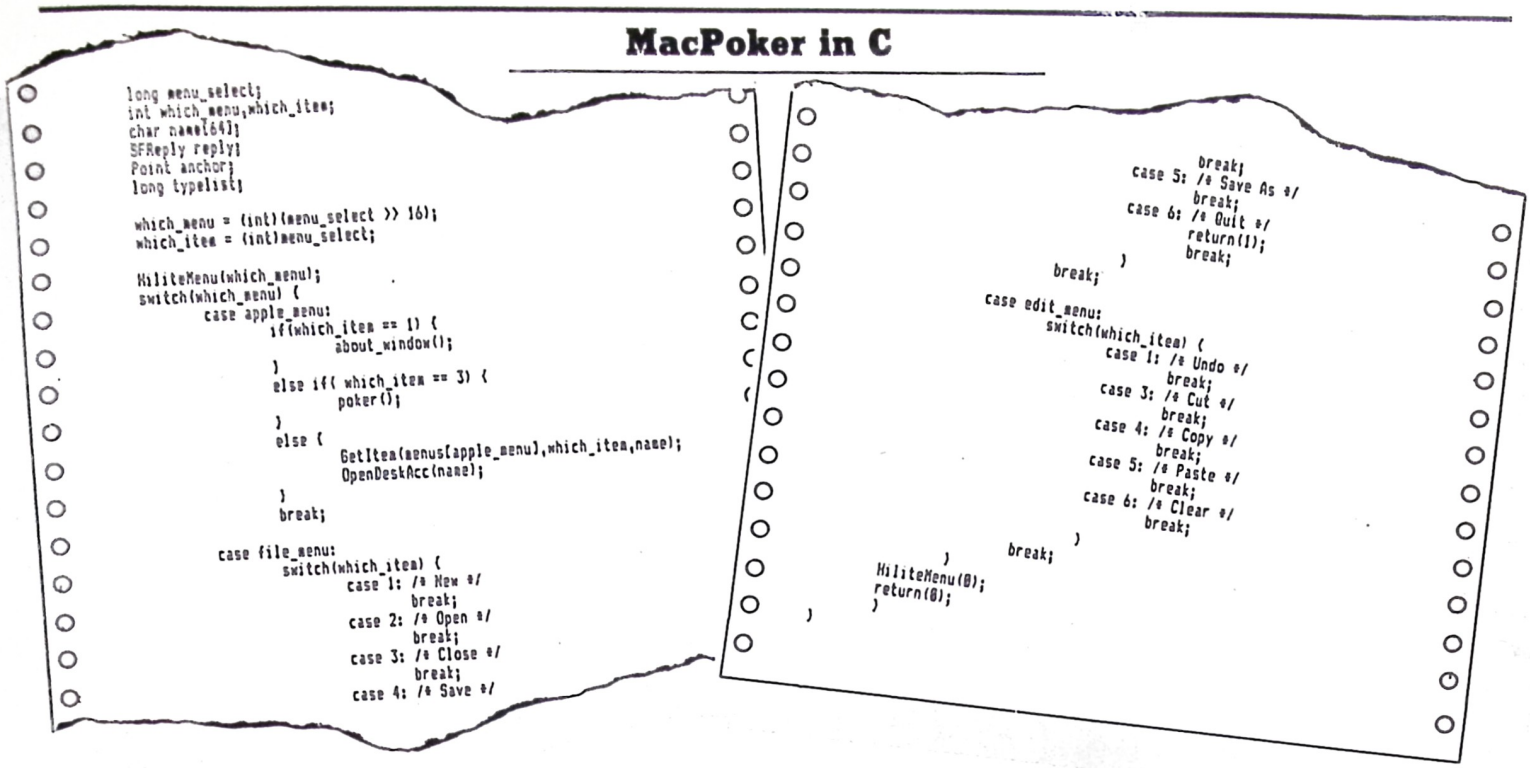
With everything ready to rip, we can finally open a window. The *NewWindow( )* function will create a window of the size and type passed in its arguments. I've used a *noGrowDocProc* window here... mostly because it gave me a place to stick the copyright notice. A number of other sorts of windows would have done equally as well.

The game itself exists within two nested *do while* loops. The outer one keeps going for as long as the value of *a* is true, that is, for as long as the game is alive. The inner one falls through whenever a hand has been

```
/*-------------------------------------------------------

        MacPoker (c) 1986 Steve Rimmer
        A draw poker bandit machine simulation

        Written in DeSmet C

        "Stand and deliver"
                        motto of a confused pizza driver

  -------------------------------------------------------*/

#include <quickdraw.h>
#include <window.h>
#include <menu.h>
#include <event.h>
#include <packages.h>
#include <textedit.h>

#define copyright       "Draw Poker \251 1986 Steve Rimmer"

#define apple_menu      1
#define file_menu       2
#define edit_menu       3

#define windowheight    200
#define windowwidth     300

#define poker_deep      200     /* size of the window the poker */
#define poker_wide      410     /* program will show up in */

#define poker_top       75
#define poker_left      25
#define poker_bottom    (poker_top + poker_deep)
#define poker_right     (poker_left + poker_wide)

#define card_wide       75      /* size of each card */
#define card_deep       100
#define card_top        25      /* position of first card */
#define card_left       20

#define hearts          1       /* arbitary numbers for suits */
#define diamonds        2
#define clubs           3
#define spades          4

#define wombat          0       /* result codes of hands */
#define pair            1
#define two_pair        2
#define three_kind      3
#define straight        4
#define flush           5
#define full_house      6
#define four_kind       7
#define straight_flush  8
#define royal_flush     9

typedef struct (int card,suit,hold; ) CARD;

WindowPeek curwindow;
TEHandle hTE;
MenuHandle menus[10];
Point nextwindow = (40,4);

struct ( char name[24];         /* the actual results and what they pay */
         int payoff;
       ) RESULT[10] = (
                ( "nothing",            0       ),
                ( "one pair",           3       ),
                ( "two pairs",          6       ),
                ( "three of a kind",    9       ),
                ( "straight",           12      ),
                ( "flush",              15      ),
                ( "full house",         24      ),
                ( "four of a kind",     75      ),
                ( "straight flush",     300     ),
                ( "royal flush",        750     )
       );

Rect CARDFRAME[5];              /* rectangles that hold cards */
char SUITS[6];                  /* string that holds suits */
char CARD_STRING[16];           /* string that holds card values */
CARD deck [4][13];              /* array of card variables */
CARD hand[6];                   /* array of cards for hand */
int Bet = 2, Pot = 0;           /* some variables */

main()
{
        InitGraf(&thePort);
        InitFonts();
        InitWindows();
        InitMenus();
        TEInit();
        InitDialogs(0L);
        InitCursor();
        InitAllPacks();         /* usual Mac gyrations */

        curwindow = 0L;
        hTE = 0L;

        init_menus();           /* set up the menus */
        all_events();           /* and play the game */
}

about_window()
{
        /* put some code for an about window here */
}

scrutinize()    /* decide what a hand is worth - returns a result code */
{
        int i,f,t;
        int pr=0,tk=0,hc=0;

        sort_hand();

        hand[5].card = 0;
        hand[5].suit = 0;
        f = 1;

        t = hand[0].suit;
        for(i=1; i<5; ++i) {
                if(hand[i].suit != t) {
                        f = 0;
                }
        }

        if(f) {
                for(i=0; i<4; ++i) {
                        if(hand[i].card +1 != hand[i+1].card) {
                                f = 0;
                        }
                }
                if(f) {
                        if(hand[4].card == 14) {
                                return(royal_flush);
                        }
                        else {
                                return(straight_flush);
                        }
                }
                else {
                        return(flush);
                }
        }
        else {
                f = 1;
                for(i=0; i<4; ++i) {
                        if(hand[i].card + 1 != hand[i+1].card) {
                                f = 0;
                        }
                }
                if(f) {
                        return(straight);
                }
                else {
                        f = 0;
                        for(i=0; i<2; ++i) {
                                if(hand[i].card == hand[i+1].card &&
                                   hand[i].card == hand[i+2].card &&
                                   hand[i].card == hand[i+3].card) {
                                        f = 1;
                                }
                        }
                        if(f) {
                                return(four_kind);
                        }
                        else {
                                f = 0;
                                for(i=0; i<3; ++i) {
                                        if(hand[i].card == hand[i+1].card &&
                                           hand[i].card == hand[i+2].card) {
                                                f = 1;
                                        }
                                }
                                if(f) {
                                        ++tk;
                                }
                                for(i=0; i<4; ++i) {
```

```
                        if(hand[i].card == hand[i+1].card &&
                           hand[i].card != hand[i+2].card &&
                           hand[i].card != hand[i-1].card) {
                                ++pr;
                                hc = hand[i].card;
                        }
                }

                if(tk == 1 && pr == 0) {
                        return(three_kind);
                }
                if(tk == 1 && pr == 1) {
                        return(full_house);
                }
                if(tk == 0 && pr == 2) {
                        return(two_pair);
                }
                if(tk == 0 && pr == 1 && hc > 10) {
                        return(pair);
                }
                else {
                        return(wombat);
                }
            }
        }
    }
}

poker()         /* play poker */
{
        WindowPtr p, NewWindow();       /* window routine and pointer */
        Rect w,g,q,b[5];                /* various rectangles */
        Point a;                        /* where the pouse is (or will be) */
        int c,a,f;
        char s[96];                     /* scratch buffer */

        TextFont(0);
        TextSize(12);
        TextFace(37);                   /* 12 point system font underlined */

        a = 1;                          /* flag for alivedness */

        strcpy(SUITS," hdcs");          /* load strings */
        strcpy(CARD_STRING," 23456789TJQKA");

        w.top = poker_top;              /* rectangle for window */
        w.left = poker_left;
        w.bottom = poker_bottom;
        w.right = poker_right;

        g.top = poker_deep - 20;        /* rectangle for Play box */
        g.left = poker_wide - 100;
        g.bottom = g.top + 15;
        g.right = g.left + StringWidth("Play") + 10;

        q.top = poker_deep - 20;        /* rectangle for Quit box */
        q.left = poker_wide - 50;
        q.bottom = q.top + 15;
        q.right = q.left + StringWidth("Quit") + 10;

        for (c=0; c<5; c++) {           /* rectangles for bets */
                sprintf(s,"$%d.00",(c+1) * 10);
                b[c].top = poker_deep - 20;
                b[c].left = 35 + (c * 55);
                b[c].bottom = b[c].top + 15;
                b[c].right = b[c].left + StringWidth(s) + 8;
        }

        for(c=0;c<5;c++) {              /* rectangles for cards */
                CARDFRAME[c].top=card_top;
                CARDFRAME[c].left=card_left+(c*(card_wide))+10;
                CARDFRAME[c].bottom=card_top+card_deep;
                CARDFRAME[c].right=card_left+(c*(card_wide))+card_wide;
        }

        TextFont(0);
        TextSize(12);
        TextFace(1);    /* 12 point bold text */

        p = NewWindow(0L,&w,copyright,1,noGrowDocProc,-1L,1,0L);
        SetPort(p);     /* open window and grab the port */

        TextFont(0);
        TextSize(12);
        TextFace(37);   /* 12 point underlined text */
        PenSize(1,1);
        FrameRoundRect(&g,8,8);
        MoveTo(g.left+9,g.bottom-4);
        DrawString("Play");     /* draw play box */

        FrameRoundRect(&q,8,8);
        MoveTo(q.left+9,g.bottom-4);
        DrawString("Quit");     /* draw quit box */

        for (c=0; c<5; c++) {
                FrameRoundRect(&b[c],8,8);
                MoveTo(b[c].left+4,b[c].bottom-4);
                sprintf(s,"$%d.00",(c+1) * 10); /* draw bet boxes */
                DrawString(s);
                if(c == Bet) {                  /* fill in the bets */
                        InvertRoundRect(&b[c],8,8);     /* invert the current bet */
                }
        }

        do {
                f = 1;                          /* main loop */
                oh_say("Click cards to hold");  /* show a message */
                PenNormal();
                no_holds();
                shuffle();                      /* turn off holds */
                deal();                         /* shuffle the cards */
                show_hand();                    /* deal the hand */
                                                /* and let's look at it */
                do {
                        while(!button());       /* wait for mouse */
                        GetMouse(&a);           /* find out where it is */
                        if(is_inrect(&q,&a)) {  /* is it quit? */
                                InvertRoundRect(&q,8,8);
                                while(button());
                                InvertRoundRect(&q,8,8);
                                a = 0;          /* not alive */
                        }
                        else if(is_inrect(&g,&a)) {     /* is it play? */
                                InvertRoundRect(&g,8,8);
                                while(button());
                                InvertRoundRect(&g,8,8);
                                deal();         /* deal non-held cards */
                                show_hand();    /* and show 'em */
                                c = scrutinize();       /* what we got? */

                                if(RESULT[c].payoff) {
                                        Pot += RESULT[c].payoff*((Bet+1)*5);
                                }
                                else {
                                        Pot -= (Bet+1) * 5;
                                }               /* update our wallet */

                                sprintf(s,"%s pays off %d. You have $%d.00.",
                                  RESULT[c].name,
                                  RESULT[c].payoff*((Bet+1)*5),Pot);
                                oh_say(s);      /* and show the glad tidings */

                                while(!button());       /* wait for mouse */
                                while(button());
                                f = 0;          /* signal for new hand */
                        }
                        else {
                                for(c=0; c<5; ++c) {
                                        if(is_inrect(&CARDFRAME[c],&a)) {
                                                hand[c].hold = !hand[c].hold;
                                                draw_card(c);
                                                while(button());
                                        }       /* is itin a card? */
                                }
                                for(c=0; c<5; ++c) {
                                        if(is_inrect(&b[c],&a)) {
                                                InvertRoundRect(&b[Bet],8,8);
                                                InvertRoundRect(&b[c],8,8);
                                                while(button());
                                                Bet = c;
                                        }       /* is it a change of bets? */
                                }
                        }
                } while(a && f);        /* while alive & not new hand */
                                        /* while alive */
        } while(a);

        DisposeWindow(p);       /* and close the window */
}

oh_say(s)
        char *s;                /* show a message in the message box */
{
        Rect b;         /* the message box */

        b.top = card_top + card_deep + 20;
        b.left = 10;
        b.bottom = card_top + card_deep + 40;
        b.right = poker_right - 40;     /* size of the box */

        EraseRect(&b);  /* kill last message */
        FrameRect(&b);  /* draw the frame */

        MoveTo(b.left + 5,b.bottom -5);
        TextFace(0);
        TextFont(0);
```

```
        TextSize(12);   /* 12 point medium */
        DrawString(s);  /* and say it */
}

sort_hand()             /* bubble sort the hand */
{
        CARD t;
        int i,f;

        do {
                f = 0;
                for(i=0; i<4; ++i) {
                        if(hand[i].card > hand[i+1].card) {
                                t.card = hand[i].card;
                                t.suit = hand[i].suit;
                                hand[i].card = hand[i+1].card;
                                hand[i].suit = hand[i+1].suit;
                                hand[i+1].card = t.card;
                                hand[i+1].suit = t.suit;
                                f = 1;
                        }
                }
        } while(f);
}

no_holds()      /* turn off all the holds */
{
        int i;

        for(i=0; i<5; ++i) { hand[i].hold = 0;}
}

show_hand()     /* show all the cards in the hand */
{
        int c;

        for(c=0; c<5; c++) {
                draw_card(c);
        }
}

is_inrect(r,p)  /* returns not zero if point p is in rect r */
        Rect *r;
        Point *p;
{
        if(p.h >= r.left &&
           p.h <= r.right &&
           p.v >= r.top &&
           p.v <= r.bottom) {
                return(1);
        }
        else {
                return(0);
        }
}
deal()          /* deal one hand */
{
        int i,x,y;

        for(i=0;i<5;++i) {
                if(!hand[i].hold) {
                        hand[i].card = 0;
                        do {
                                x = get_rnd(13);
                                y = get_rnd(4);
                                if(deck[y][x].card) {
                                        hand[i].card = deck[y][x].card;
                                        hand[i].suit = deck[y][x].suit;
                                        deck[y][x].card = 0;
                                }
                        } while(!hand[i].card);
                }
        }
}
shuffle()       /* initialize the card array and seed the random numbers */
{
        int x,y;
        long TickCount();

        for(y=0; y<4; ++y) {
                for(x=0; x<14; ++x) {
                        deck[y][x].card = x + 2;
                        deck[y][x].suit = y + 1;
                }
        }

        srand((int)TickCount());
}

get_rnd(i)      /* get a random number between 0 and i */
{
        int x;

        do {
                x = rand() / (32676 / i);
        } while( x > i);
        return(x);
}

draw_card(p)    /* draw card at position p */
        int p;
{
        char b[6];

        EraseRoundRect(&CARDFRAME[p],10,10);
        FrameRoundRect(&CARDFRAME[p],10,10);
        TextFace(1);
        TextSize(12);

        MoveTo(CARDFRAME[p].left + 8,CARDFRAME[p].top + 16);
        sprintf(b,"%c%c",*(CARD_STRING+hand[p].card),*(SUITS+hand[p].suit));
        DrawString(b);
        MoveTo(CARDFRAME[p].right -20,CARDFRAME[p].bottom -8);
        sprintf(b,"%c%c",*(SUITS+hand[p].suit),*(CARD_STRING+hand[p].card));
        DrawString(b);
        if(hand[p].hold) {
                InvertRoundRect(&CARDFRAME[p],10,10);
        }
        TextFace(0);
        TextSize(12);
}

init_menus()            /* set up the menus - most are dummies for this */
{
        MenuHandle NewMenu();

        menus[apple_menu] = NewMenu(apple_menu, "\024");
        AppendMenu(menus[apple_menu],"About reality;-;Poker");
        AddResMenu(menus[apple_menu], 'DRVR');
        InsertMenu(menus[apple_menu], 0);

        menus[file_menu] = NewMenu(file_menu,"File");
        AppendMenu(menus[file_menu],"New /N;Open;Close;Save /S;Save as;Quit /Q");
        InsertMenu(menus[file_menu], 0);

        menus[edit_menu] = NewMenu(edit_menu, "Edit");
        AppendMenu(menus[edit_menu],"Undo /Z;(-;Cut /X;Copy /C;Paste /V;Clear");
        InsertMenu(menus[edit_menu], 0);

        DrawMenuBar();
}

all_events()    /* handle all the events */
{
        EventRecord myevent;
        int dead, pick;
        WindowPtr which_window,FrontWindow();
        long menu_select,MenuSelect(),MenuKey();
        long newsize,GrowWindow();
        Rect limit,r;
        Point anchor;
        GrafPtr saveport;

        dead = 0;
        while (!dead) {
                SystemTask();
                if (hTE != 0) {
                        TEIdle(hTE);
                }

        GetNextEvent(everyEvent,&myevent);
        switch (myevent.what) {
                case mouseDown:
                        pick = FindWindow(&myevent.where,&which_window);
                        switch(pick) {
                                case inSysWindow:
                                        SystemClick(&myevent, which_window);
                                        break;

                                case inMenuBar:
                                        menu_select = MenuSelect(&myevent.where);
                                        dead = do_command(menu_select);
                                        break;

                                case inGoAway:
                                        break;
                                }
                        break;
                }
        }
}

do_command(menu_select)         /* handle a menu command - mostly dummies */
{
```



```
long menu_select;
int which_menu,which_item;
char name[64];
SFReply reply;
Point anchor;
long typelist;

which_menu = (int)(menu_select >> 16);
which_item = (int)menu_select;

HiliteMenu(which_menu);
switch(which_menu) {
        case apple_menu:
                if(which_item == 1) {
                        about_window();
                }
                else if( which_item == 3) {
                        poker();
                }
                else {
                        GetItem(menus[apple_menu],which_item,name);
                        OpenDeskAcc(name);
                }
                break;

        case file_menu:
                switch(which_item) {
                        case 1: /* New */
                                break;
                        case 2: /* Open */
                                break;
                        case 3: /* Close */
                                break;
                        case 4: /* Save */
                                break;
                        case 5: /* Save As */
                                break;
                        case 6: /* Quit */
                                return(1);
                                break;
                }
                break;
        case edit_menu:
                switch(which_item) {
                        case 1: /* Undo */
                                break;
                        case 3: /* Cut */
                                break;
                        case 4: /* Copy */
                                break;
                        case 5: /* Paste */
                                break;
                        case 6: /* Clear */
                                break;
                }
                break;
        }
HiliteMenu(0);
return(0);
}
```

played so that the game can restart in the outer loop.

The game itself takes place in the inner do *while* loop. The construction

```
while(!button());
```

is a convenient way to wait for a mouse click. The *button( )* function returns true whenever the mouse button has been belted. The subsequent *GetMouse( )* function loads the *Point* variable *m* with the local co-ordinates of the mouse when it's called... as it's only called after the button has been hit, it represents a convenient way of finding out where the mouse was when the button went down.

Note that we do a

```
while(button());
```

after this to make sure that the mouse gets released before any subsequent processing is done. This keeps the program from looping repeatedly if it gets finished all the checking in the loop while the button is still down.

The rest of the code in the inner loop checks to see where the mouse was when it was clicked and does whatever is appropriate. Clicking in the "Quit" box simply sets the value of *a* to false and falls through the loop to end the game. Notice that we invert the box while the button is down to make this thing work like a proper Mac dialog.

The "Play" box causes much of the rest of the program to get executed. The first thing that gets called is *deal( )*, which may seem a bit confusing. This routine actually does two things. Its primary function is to deal the cards, but, in effect, it only deals cards to those places in the hand which aren't flagged as being held. Initially, there are no holds, so a full hand is dealt. When this function is called after the play button is clicked, some of the cards will probably be marked as being held. The *deal( )* function will leave these as they are.

The *show_hand( )* function displays the new cards, while *scrutinize( )* checks the hand, returning a result code in *c*. Most of the rest of the code in this area is involved in updating the pot, that is, the amount of money the human playing the thing has won or lost.

The other two options in this area are clicking in a card and clicking in a bet box. We can check both of these easily, as the rectangle variables for them are preserved, and can be passed to *is_inrect( )*. If it turns out that a card has been clicked, its corresponding hold flag is toggled... *not*ed, actually... and the card itself in inverted. Thus, clicking a card once sets it on hold. Clicking it again frees it up.

The bet boxes work a bit differently. The program starts off with the middle one inverted. Clicking any other one will uninvert the current one and invert the clicked one.

The rest of the program is all involved in *scrutinize( )*. This determines what the current hand is worth. It does this by matching the cards against acceptable patterns, trickling down through patterns of decreasing values.

The task of pattern matching the cards is greatly simplified if they're sorted. The *sort_hand( )* function is a basic bubble sort which operates on the numeric value of the cards. Yes, I know, it's crude, but, as we're only up for sorting a maximum of five cards anything more sophisticated would have resulted in a lot more code with no meaningful improvement in the way the game played.

It's fairly easy to see how the scrutinizer works from this point on, bearing in mind that the cards have been sorted. You'll never actually see them sorted, as the sorting is done after the last time a hand is displayed. The thing looks for flushes first... a royal flush will have the ace... card fourteen... as its highest card. Thereafter we check for straights.

Three of a kind and pairs are a bit trickier, as you can see. It's easy to write code which will mistake three of a kind for two pairs. The variables *tk* and *pr* count the instances of three of a kind and pairs.

You might want to change the weighting system I've given the various combinations here. I was feeling a bit self indulgent when I wrote this, and I had it lose rather more devastatingly than it probably should.

Five Aces

One of the things I've encountered in a lot of public domain Mac software is the inclusion of "captive" desk accessories, that is, games and utilities which turn up in the desk accessory menus of programs but are actually parts of the programs, not true desk accessories at all. These things are rather pleasing... some of them have been more entertaining than the programs they were part of. I've set this thing up as one of these... you can see how it's done in the *init_menus( )* function.

You might want to contrive to replace, say, the puzzle accessory with this thing. We've all grown a bit weary of the trusty old puzzle by now. This is fairly easy to do, so that poker comes up while your main program is running, and returns control to the puzzle when your program returns you to the finder. You might want to hack with the *init_menus( )* code to get this together. **CN!**

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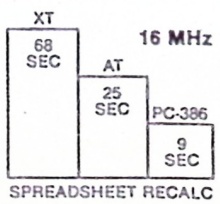

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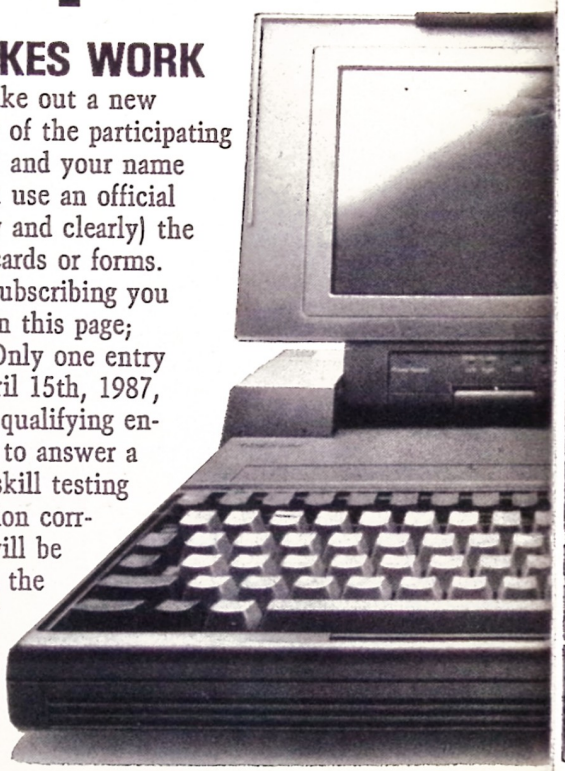

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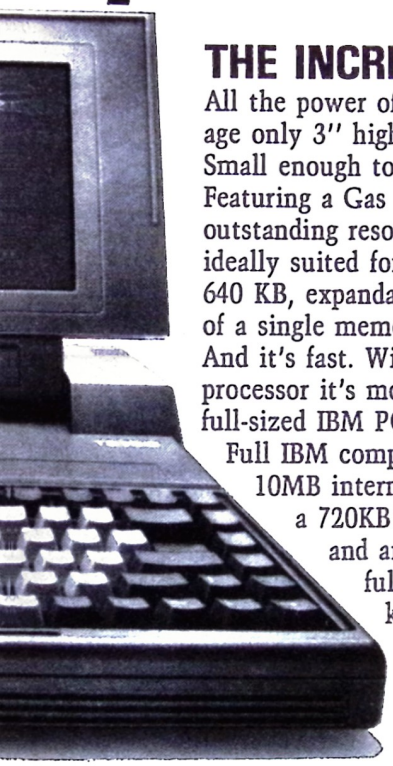

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Canara Technologies 19, 31, 55
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Computer Unlimited 79
Comtex Microsystems 35
EMJ Data Systems Ltd. 46
Exceltronix 2, 3, 4, 50
Future-Tron 43
Gentek Marketing Inc. 40
Lanpar Technologies ..... Product Card Section
Lattice, Incorporated 22
Maple Software Limited 63
McGraw Hill 16, 17
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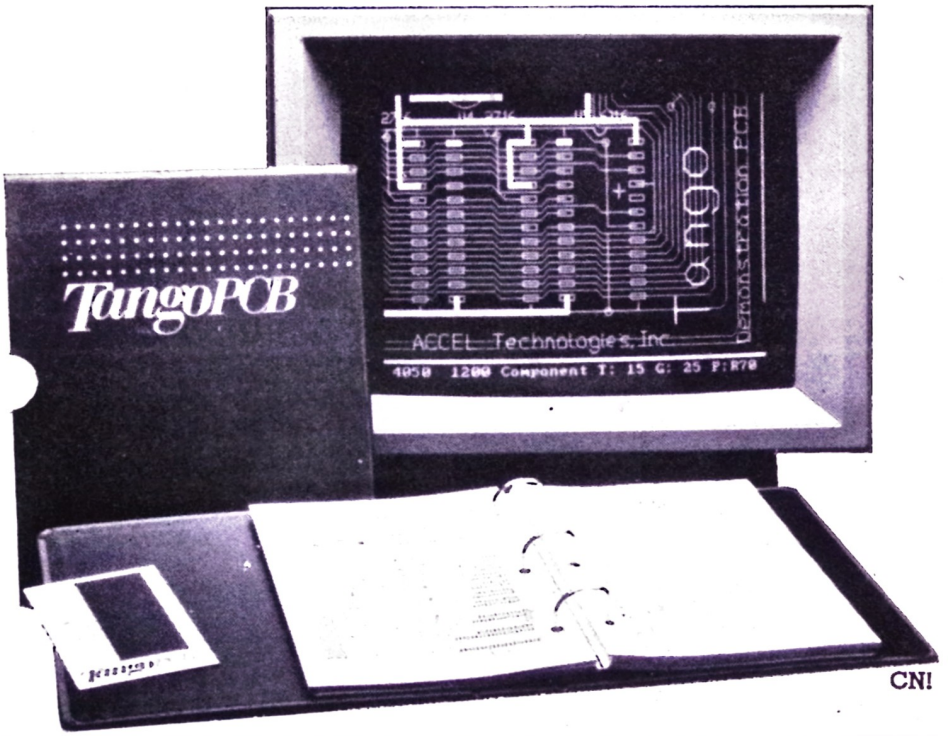
Costing $495 American, you can also get a demonstration kit for $10, all from Accel Technologies, 7358 Trade Street, San Diego, California 92121, telephone (619) 695-2000.



CN!

Recently Received

Disclaimer: The software packages listed here have been received in this office, but have not been reviewed; in-depth reviews may be published at a later date. Inclusion does not necessarily imply endorsement.

Ready, Set, Go! version 3.0 by *Manhattan Graphics* will be marketted exclusively by Letraset. For the Macintosh, it's an electronic page design package combining text composition, word processing and page layout functions, and featuring a linker tool, the ability to import formatted text, and PostScript compatiblility. The retail price in Canada will be $559.

For further information and nearest dealer, contact Letraset Canada at 555 Alden Road, Markham, Ontario L3R 3L5, or call them at (416) 475-7511.

PC Bank version 1.0 covers sixteen of the most used financial functions, specifically loan repayment schedules, mortgage amortization schedules and comparison tables, interest on investments and fixed period investments. Running on an IBM PC or compatible, PC Bank requires 28K, a double-sided disk drive and either monochrome or colour graphics adapter. The price is $99.95.

Sargent Software, Box 856, Red Deer, Alberta T4N 5H3, telephone (403) 886-2569.

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Items
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- Pt markers
- Arcs & circles
- Note text
- Polygons & ellipses
- Symbols/individual & nested

Item attributes
- 16 pen colors
- 255 Layers
- 8 Linetypes
- 12 Text fonts
- 32 Pt marker types

Screen Display
- Zoom/Pan/Full
- 8 Save Views
- Slide save/view
- Grids on/off

Metric & English Standards
- Engineering (decimal/fractional)
- Architectural (ft-in)

Project drawing info

Numeric input
- Keyboard and cursor
- Absolute Relative Polar

Snap Modes
- Gridpoint
- Endpoint
- Midpoint
- Intersect
- On item
- Quadrant
- Tangent
- Arc center

Transform/Copy
- Move
- Rotate
- Scale
- Mirror
- Align

Modify/Edit
- Attributes
- Break/Divide
- Fillet/chamfer
- Trim
- Stretch
- Erase
- Explode symbols & polygons
- Mask
- Replace
- Merge
- Region select
- Workgroup

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- Linear Hor/Ver/Aligned
- Angular
- Dia/Radius
- Leader Notes
- Ordinate
- Chain & Baseline

Check calculations
- Coordinates
- Distance & angle
- Area & perimeter

Item Masking

Hardware

Computers
- IBM PC XT AT and compatibles
- AT&T 6300 Plus
- Zenith
- System Requirements
  - 512K RAM
  - RS 232 Comm port
  - Mouse or digitizer
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